EX 5/7/11 RT Systems

Installation and User Manual

MGE
Office Protection Systems

EX 5/7/11 RT Systems
Installation and User Manual

Revision History

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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS. This manual contains important instructions that should be followed during installation and maintenance of the UPS and batteries.

The **EX 5/7/11 RT** models that are covered in this manual are intended for installation in an environment within 0 to 40°C, free of conductive contaminant.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Certification Standards

- IEEE 587-1980/ANSI C62.41 1980 Standards for Surge Withstand Ability
- FCC rules and regulations of Part 15, Subpart J, Class A
- UL listed under 1778, Standards for Uninterruptible Power Supply Equipment
- IEC 61000-4-2 (ESD): level 4.
- IEC 61000-4-3 (Radiated field): level 3.
- IEC 61000-4-4 (EFT): level 4.
- IEC 61000-4-5 (Fast transients): level 4.
- IEEE-C6241 Category B (ring wave).
- IEC 61000-4-6 (electromagnetic field).
- IEC 61000-4-8 (conducted magnetic field).

CAUTION: Safety of persons

- The system has its own power source (the battery). Consequently, the power outlets may be energized even if the systems is disconnected from the AC power source.
- Dangerous voltage levels are present within the system. It should be opened exclusively by qualified service personnel.
- The system must be properly grounded.
- The battery supplied with the system contains small amounts of toxic materials. To avoid accidents, the directives listed below must be observed:
  -Never burn the battery (risk of explosion).
  -Do not attempt to open the battery (the electrolyte is dangerous for the eyes and skin).
  -Comply with all applicable regulations for the disposal of the battery.
  -Batteries constitute a danger (electrical shock, burns). The short-circuit current may be very high. Precautions must be taken for all handling: remove watches, rings, bracelets and any other metal objects, use tools with insulated handles.
  -Do not lay tools or metal parts on top of batteries.

CAUTION: Product Safety

- The UPS connection instructions and operation described in the manual must be followed in the indicated order.
- A protection circuit breaker must be installed upstream and be easily accessible. The system can be disconnected from the AC power source by opening this circuit breaker.
- Check that the indications on the rating plate correspond to your AC powered system and to the actual electrical consumption of all the equipment to be connected to the system.
- Never install the system near liquids or in an excessively damp environment.
- Never let a foreign body penetrate inside the system.
- Never block the ventilation grates of the system.
- Never expose the system to direct sunlight or source of heat.
- If the system must be stored prior to installation, storage must be in a dry place.
- The admissible storage temperature range is -25ºC to +55ºC.

Special Precautions

- All handling operations will require at least two people (unpacking, installation in rack system).
- Before and after the installation, if the UPS remains de-energized for a long period, the UPS must be energized for a period of 24 hours, at least once every 6 months (for a normal storage temperature less than 25°C). This charges the battery, thus avoiding possible irreversible damage.
- During the replacement of the Battery Module, it is imperative to use the same type and number of element as the original Battery Module provided with the UPS to maintain an identical level of performance and safety. In case of doubt, don't hesitate to contact your MGE Office Protection Systems representative.

Environment

- **This product has been designed to respect the environment:**
  It does not contain any Chlorofluorocarbon (CFC) or Hydrochlorofluorocarbon (HCFC).

- **UPS recycling at the end of service life:**
  MGE Office Protection Systems undertakes to recycle, by certified companies and in compliance with all applicable regulations, all UPS products recovered at the end of their service life (contact your MGE Office Protection Systems branch office).
- **Packing:**
  UPS packing materials must be recycled in compliance with all applicable regulations.

  WARNING: This product contains lead-acid batteries. Lead is a dangerous substance for the environment if it is not properly recycled by specialized companies.

CAUTION: Record All Serial Numbers!

RECORD ALL SERIAL NUMBERS FOR EX 5/7/11 RT AND ACCESSORIES.

THESE SERIAL NUMBERS WILL BE REQUIRED IF YOUR SYSTEM NEEDS SERVICE.

KEEP THIS MANUAL IN A PLACE WHERE YOU CAN REFERENCE THE SERIAL NUMBERS IF SERVICE IS REQUIRED!

☐ **EX 5RT System** ☐ **EX 7RT System** ☐ **EX 11RT System**

Power Module SERIAL NUMBER: _____

Battery Module SERIAL NUMBER: _____

Transformer Module SERIAL NUMBER: _____

CLA Module SERIAL NUMBER: _____

ADDITIONAL MODULES SERIAL NUMBERS:

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Symbol Usage

This manual uses the following icon symbols with text to convey important information and tips.

WARNING	**Indicates information provided to protect the user and service personnel against safety hazards and/or possible equipment damage.**
CAUTION	**Indicates information provided to protect the user and service personnel against possible equipment damage.**
IMPORTANT	**Indicates information provided as an operating instruction, or as an operating tip.**
NOTE	**Indicates information provided as an operating tip or an equipment feature.**

Visual Action Audio LED OFF LED ON LED Flashing

Section Descriptions

1 Introduction

Introduction is a general description of system configurations of the EX 5/7/11 RT, and its mechanical electrical characteristics. Additionally there is an optional accessories section with important information on MGE Office Protection Systems products that will enhance the performance of the EX 5/7/11 RT. Please contact your MGE Office Protection Systems representative for detailed information on these options.

2 Setup and Installation

Setup and Installation guides the user through tools and equipment required for connecting the EX 5/7/11 RT and battery installation or replacement. Included are assembly instructions, power cable connections with wire diagrams for configuring the product to hardware specifications.

3 Operation

Operation describes the EX 5/7/11 RT systems characteristics of indicators and controls, modes,and specifications. The user procedures include performing software programming that will maintain optimal performance.

4 Maintenance

Maintenance includes a troubleshooting guide of symptoms and possible solutions, hot swapping the Power module, Battery module, and testing scenarios.

5 Appendix

Electrical and Mechanical specifications for the EX 5/7/11 RT.

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Thank you for selecting an MGE Office Protection Systems product to protect your electrical equipment.

The product you selected is a part of the EX RT series. The EX RT series is a family of Uninterruptible Power Supply (UPS) designed to provide safe, and reliable AC power back-up for sensitive electrical equipment. To discover the entire range of MGE Office Protection Systems products, we invite you to visit our website at www.mgeops.com.

1.0 Scope

Introduction is a general description of system configurations of the EX 5/7/11 RT, and its mechanical electrical characteristics. Additionally there is an optional accessories section with important information on MGE Office Protection Systems products that will enhance the performance of the EX 5/7/11 RT. Please contact your MGE Office Protection Systems representative for detailed information on these options.

Table 1-1: EX RT Model Descriptions and Contents.

System Description		System Contents							Output Voltage
Model #	Part #	Power Module			Battery Module		Transformer Module		
		86215	86216	86217	86207	86209	86211	86311	
5 kVA HV EX 5RT	86050	X			X				200/208/220/ 230/240/250
5 kVA LV EX 5RT	86201	X			X			X	120/208/240
7 kVA HV EX 7RT	86070		X		X				200/208/220/ 230/240/250
7 kVA LV EX 7RT	86203		X		X			X	120/208/240
11 kVA HV EX 11RT	86110			X		X			200/208/220/ 230/240/250
11 kVA LV EX 11RT	86205			X		X	X		120/208/240

Also: All units include rail kits for rack mounting and stabilizing feet for tower configuration.

NOTE

The Power Module is factory configured for single Mains input at 208VAC, 60Hz. Other input-output voltage settings are available. See Section 3.2.1. Input voltage must be the same as output voltage on HV units!

Table 1-2: Optional Accessories (See Section 1.5 for description)

Part Number	Description
86001	Rail Kit for Power Module EX 5/7/11 RT
86002	Rail Kit for Battery/Transformer/CLA Module
86005	Battery Integration Kit with Casters
86006	Battery Extension Cable Kit
86008	Empty Battery Chassis EXB RT W/EPO
86009	I/O Box 5/7kVA UL/US
86010	I/O Box 11kVA UL/US
86012	I/O Box Bracket System
86013	Rear Bracket Supports
86207	Battery Module EXB 5/7RT
86209	Battery Module EXB 11RT
86211	EX RT Transformer Module (11kVA)
86213	CLA Charger Module
86215	5kVA Power Module EX 5RT
86216	7kVA Power Module EX 7RT
86217	11kVA Power Module EX 11RT
86311	EX RT Transformer Module (7kVA)

1.1 System Electrical Characteristics

Table 1-3: UPS Characteristics System Ratings.

UPS Characteristics									
MAIN 1 (Normal AC Source) **default**									
Power Rating	**Input Voltage (VAC)**	**Input Current (A)**				**Input Breaker (A)**	**Output Voltage (VAC)**	**Output Current (A)**	**Inrush Current**
		Min	**Max**	**Online**	**Bypass**				
5 kVA	208	18	32	21.6	19	40	208	19.25	200A/1ms
7 kVA		25	45	30.3	26.65	50		23.5	
11 kVA		38	64	44	42	70		47.5	

Table 1-4: Transformer Module Characteristics Ratings.

Transformer Module Characteristics			
Input Voltage (VAC)	**208/240**		
Output Voltage (VAC)	**120/120**	**208**	**240**
Max. Output Current (A)	**33.3/33.3**	**52**	**45**

CAUTION

Power Module is factory configured at 208Vac, 60 Hz input and output.

Without transformer, Input and Output of the UPS must always be the same.

On 11KVA, 10% de-rating for 200/208VAC.

Isolated 120/208/240VAC are available with EX RT Transformer Module.

Table 1-5: Battery Module Ratings.

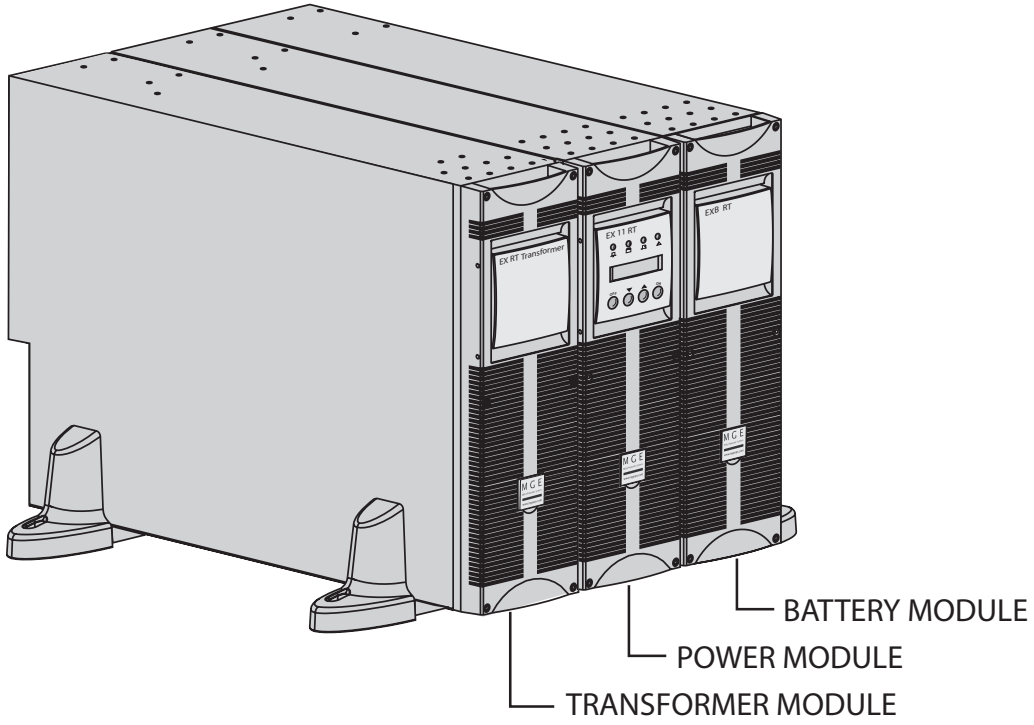
Part Number	86207	86209
Battery Type	12VDC/7Ah	12VDC/9Ah
Battery Output Voltage	240VDC	240VDC

1.2 Standard Configuration

The EX 5/7/11 RT systems can be set up in tower or rack configurations.

1.2.1 Tower Configuration

Figure 1-1: Tower Configuration with Power Module, Battery Module, and optional Transformer Module.



1.2.2 Rack Configuration

Figure 1-2: Rack Configuration with Power Module, Battery Module, and optional Transformer Module.

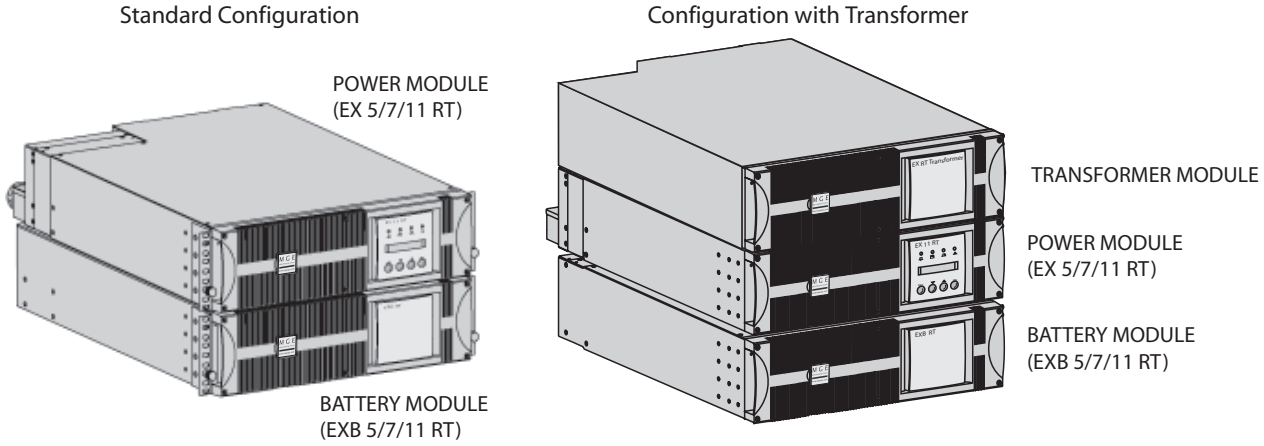


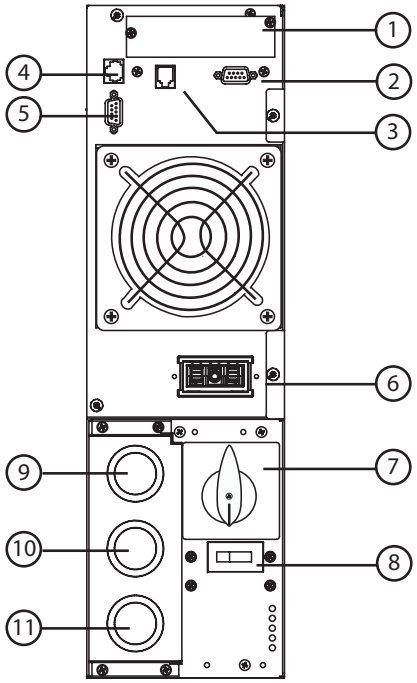
Table 1-6: System Dimensions and Weights.

Model	Dimensions (HxWxD)	Weights
EX 5/7RT Power Module	(3U) 5.16” x 17.49” x 26.25” (131 x 444 x 667mm)	49.6 lbs (22.5 kg)
EX 11RT Power Module	(3U) 5.16” x 17.49” x 26.25” (131 x 444 x 667mm)	60.6 lbs (27.6 kg)
EXB 5/7RT Battery Module	(3U) 5.16” x 17.49” x 25” (131 x 444 x 635mm)	142 lbs (64.5 kg)
EXB 11RT Battery Module	(3U) 5.16” x 17.49” x 25” (131 x 444 x 635mm)	151 lbs (68.5 kg)
EX RT Transformer Module (11kVA)	(3U) 5.16” x 17.49” x 25” (131 x 444 x 635mm)	173 lbs (78.5 kg)
CLA Charger Module	(3U) 5.16” x 17.5” x 25	26.5 lbs (12 kg)
EX RT Transformer Module (7kVA)	(3U) 5.16” x 17.49” x 25” (131 x 444 x 635mm)	173 lbs (78.5 kg)

1.3 Rear Panel Components

1.3.1 Power Module EX 5/7/11 RT

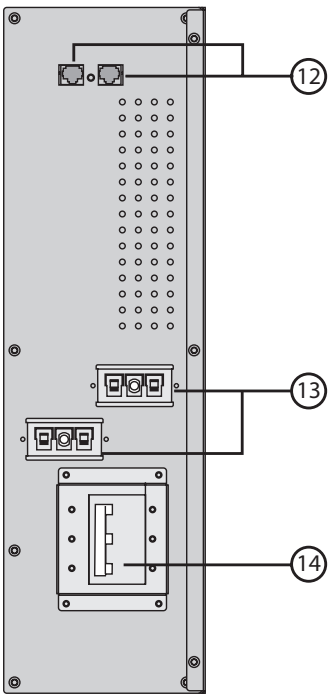
Figure 1-3: Rear panel of the Power Module.



1. Slot for optional communication cards.
2. Dry (relay) contacts Communication Port.
3. Remote Emergency Power Off (REPO) function. (See Section 2.6.)
4. Connector for automatic detection of Battery Module(s).
5. RS232 communication port.
6. Battery/CLA Module power connector.
7. Manual Bypass switch.
8. Normal AC source circuit breaker.
9. Knockout for entry of AC Output conduit.
10. Knockout for entry of Normal AC source conduit.
11. Knockout for entry of Bypass AC source conduit.

1.3.2 Battery Module EXB 5/7/11RT With Remote Emergency Power Off (REPO) Function

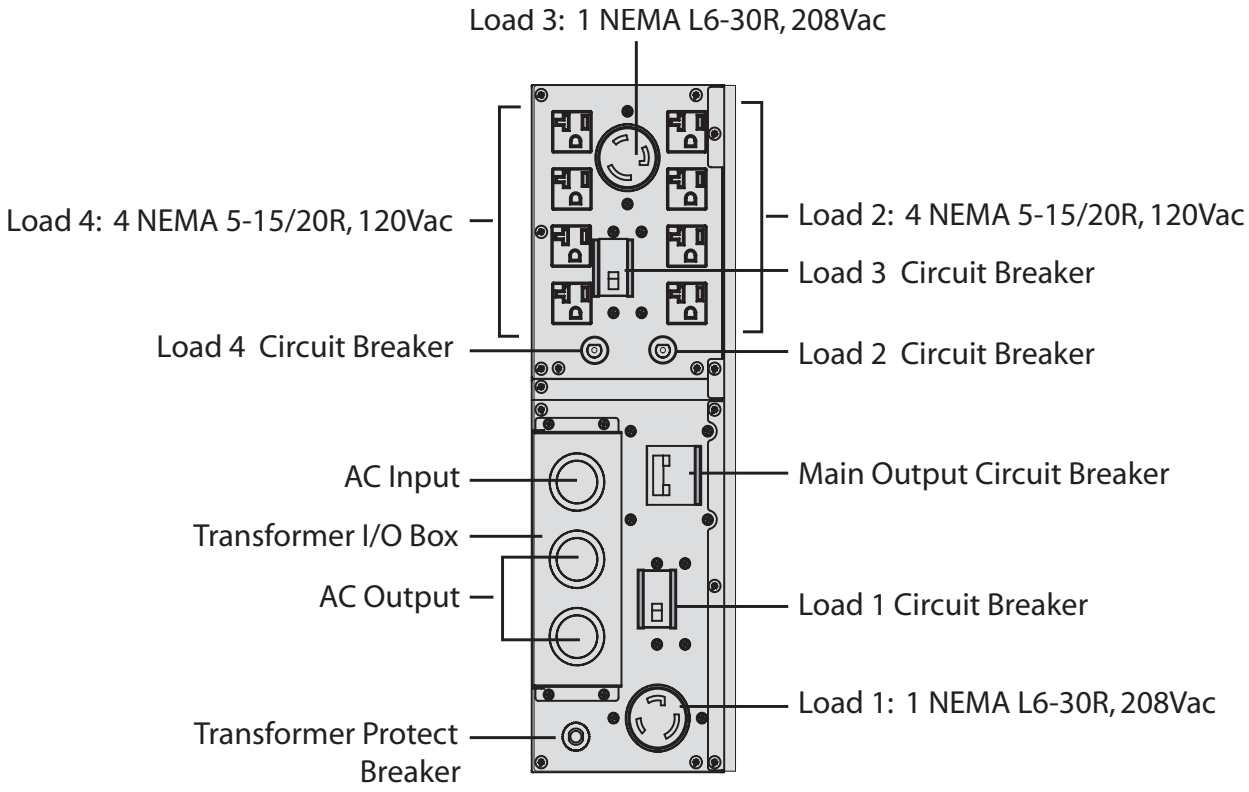
Figure 1-4: Rear Panel of the Battery Module.



12. Connectors for automatic detection of additional battery module(s) (to the UPS or to other Battery Modules).
13. Battery power connectors (to the UPS or to other Battery Modules).
14. Battery Circuit Breaker with shunt trip.

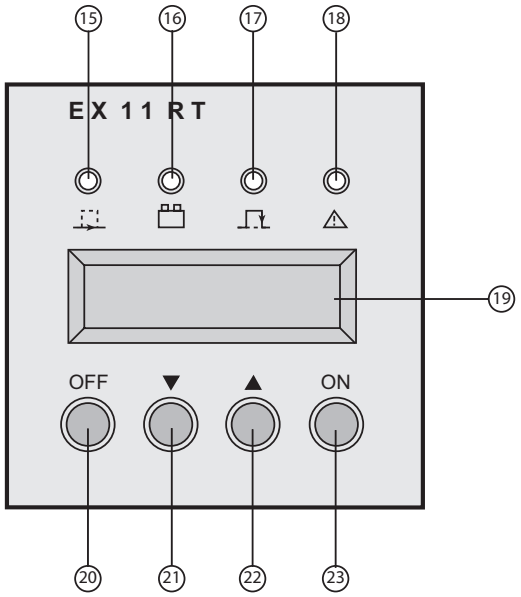
1.3.3 EX RT Transformer Module

Figure 1-5: Rear Panel of the optional Transformer Module. (PN 86211/86311)


Load 3: 1 NEMA L6-30R, 208Vac
Load 4: 4 NEMA 5-15/20R, 120Vac
Load 2: 4 NEMA 5-15/20R, 120Vac
Load 3 Circuit Breaker
Load 4 Circuit Breaker
Load 2 Circuit Breaker
AC Input
Main Output Circuit Breaker
Transformer I/O Box
AC Output
Load 1 Circuit Breaker
Load 1: 1 NEMA L6-30R, 208Vac
Transformer Protect Breaker

1.4 Power Module Display and Control Panel

Figure 1-6: View of typical control panel interface.



15 Load protected/On-line Operation LED.

16 Operation on battery LED.

17 Operation on bypass LED.

18 Fault LED.

19 LCD display.

20 UPS OFF button.

21 22 Function buttons (scroll up/scroll down).

23 UPS ON button (or function button in personalization mode).

1.5 Optional Accessories

Optional Accessories describes the options available for upgrades and enhancement of the EX 5/7/11 RT systems. Detailed installation of the unit is described in following sections.

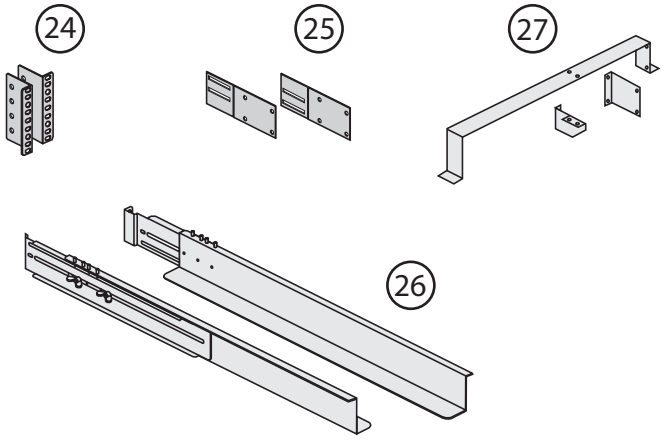
To ensure a successful installation, all procedures should be followed in their correct sequence. Note that any unauthorized installation may cause damage to the UPS(s) and void the MGE Office Protection Systems warranty.

1.5.1 Power Module Rail Kit

(Part Number 86001)

This kit is for rack mounting the Power Module in a 19" enclosure. See Section 2.4.3 for rack installation of Power Module.

Figure 1-7: Power Module Rail Kit.



(24) Front mounting brackets.

(25) Rear support brackets, part number 86013. This can be ordered separately.

(26) Telescopic rails, 25.16" to 39.61" length (639 mm to 1005 mm).

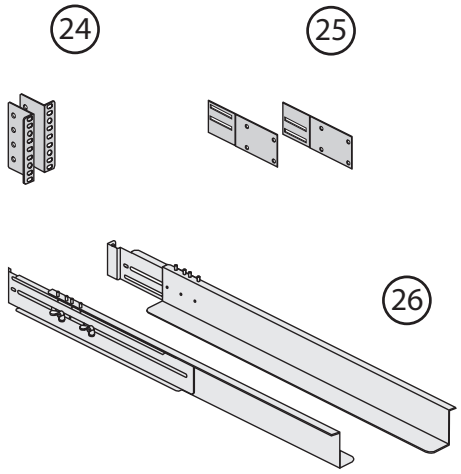
(27) Input/Output Box bracket system, part number 86012.

1.5.2 Battery/Transformer/CLA Module Rail Kit

(Part number 86002)

This kit is for rack mounting of the Battery/Transformer/CLA Module in 19" enclosure. See Section 2.4.3 for rack installation of module.

Figure 1-8: Battery/Transformer/CLA Module Rail Kit.



(24) Front mounting brackets.

(25) Rear support brackets, part number 86013. This can be ordered separately.

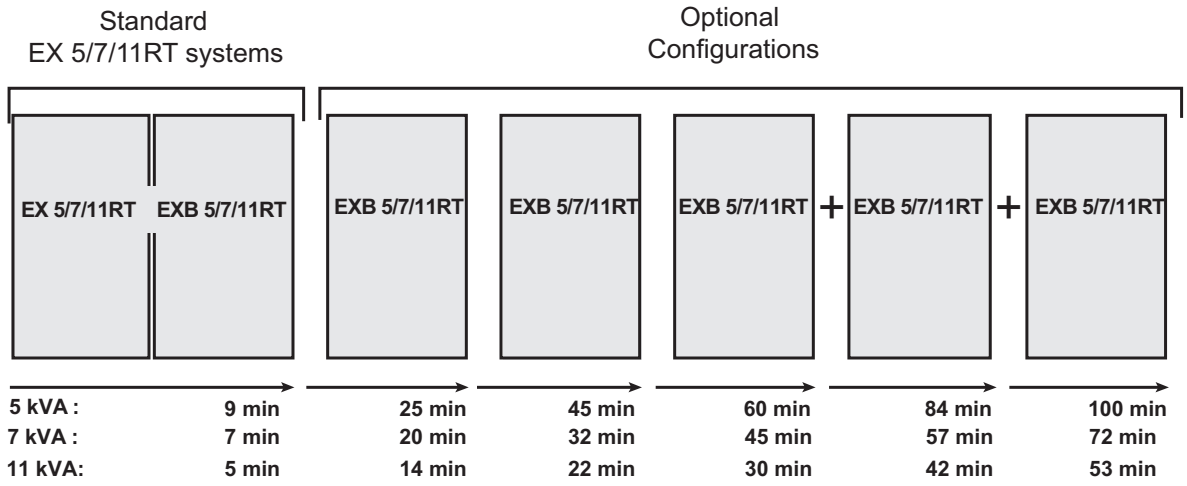
(26) Telescopic rails, 25.16" to 39.61" length (639 mm to 1005 mm).

1.5.3 Multiple Battery Module Back-up Time at Full Load

Standard EX 5/7/11 RT systems (one Power Module and one Battery Module), offers a standard back-up time of 5 to 12 minutes at full load.

To increase back-up time, it is possible to connect up to 5 additional Battery Modules to the standard system. See Section 2.8 for connections between standard system and Battery Module (EXB 5/7/11RT)

Figure 1-9: Typical back-up time with multiple EXB's at full load.


Standard
EX 5/7/11RT systems
Optional
Configurations
EX 5/7/11RT
EXB 5/7/11RT
EXB 5/7/11RT
EXB 5/7/11RT
EXB 5/7/11RT
EXB 5/7/11RT
EXB 5/7/11RT
5 kVA : 9 min 25 min 45 min 60 min 84 min 100 min
7 kVA : 7 min 20 min 32 min 45 min 57 min 72 min
11 kVA: 5 min 14 min 22 min 30 min 42 min 53 min

See Appendix for additional Back-up time information.

1.5.4 Battery Extension Cable Kit

(6 ft./1.8 m, Part number 86006)

This extended battery cable kit will be used instead of the standard battery cable when Battery Modules (EXBs) are distant from each other (located in two different enclosures, for instance).

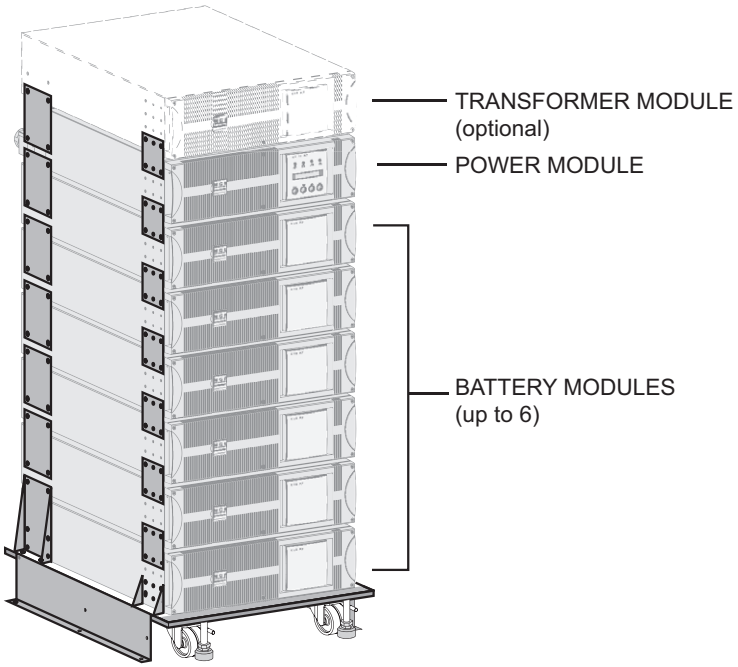
The battery extension cable kit includes a 6 ft. long, straight connector battery power cable, and a 6 ft. long battery detection cable.

1.5.5 Battery Integration Kit with Casters

(Part number 86005)

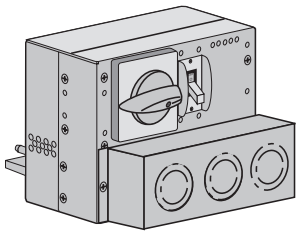
Battery Integration Kit is a cart, designed to hold up to 8 modules. It has swivel wheels with brakes, leveling feet, seismic floor mount panels, plates to lock modules and hardware included. Modules not included.

Figure 1-10: Typical Battery Integration kit with casters setup.



(Modules Not Included In Kit)

1.5.6 Input/Output Box

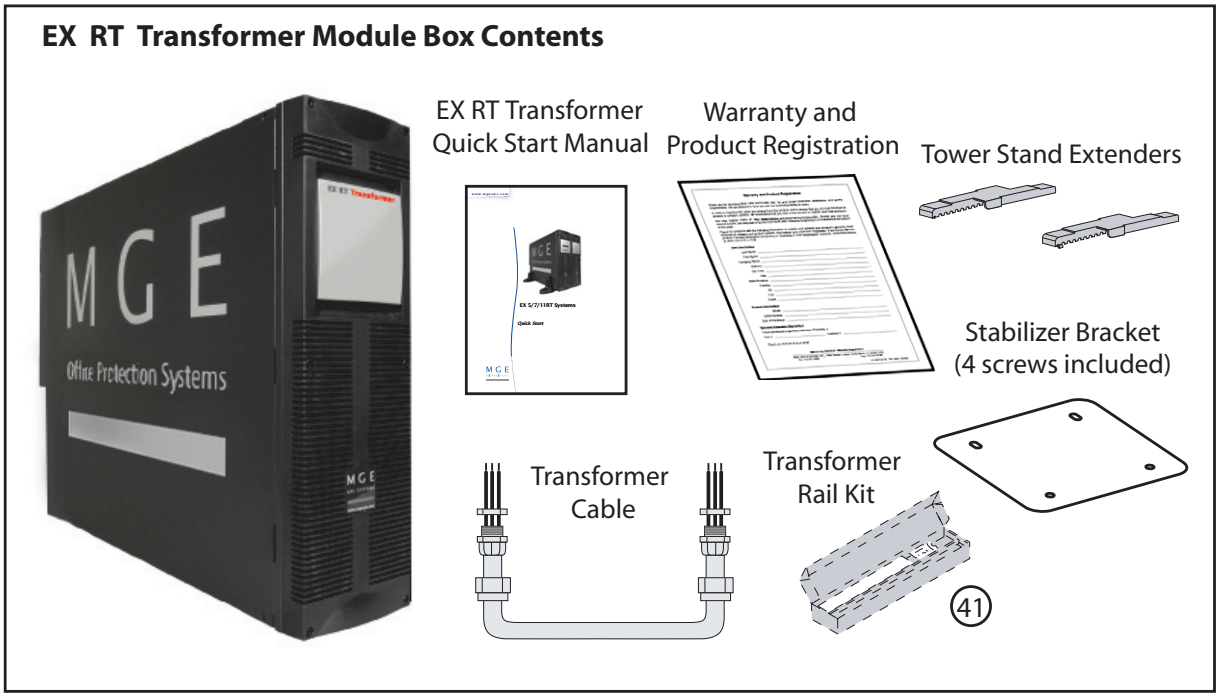


- I/O Box 5/7kVA Part number 86009
- I/O Box 11kVA Part number 86010

1.5.7 Transformer Module - For use with EX 5/7/11 RT Power Module

This module provides isolated 120/208/240VAC outputs.

Figure 1-11: Typical Transformer Module Contents and Connections.



1.5.8 CLA Charger Module

Extended back-up time (up to 8 hours at full load) requires a high power battery cabinet connected to the EX 5/7/11 RT via the CLA Module.

IMPORTANT **The CLA can not be used to charge the Battery Module (EXB). It is designed to charge the customer provided high power battery cabinet.**

Figure 1-12: CLA Module Contents and Connections.

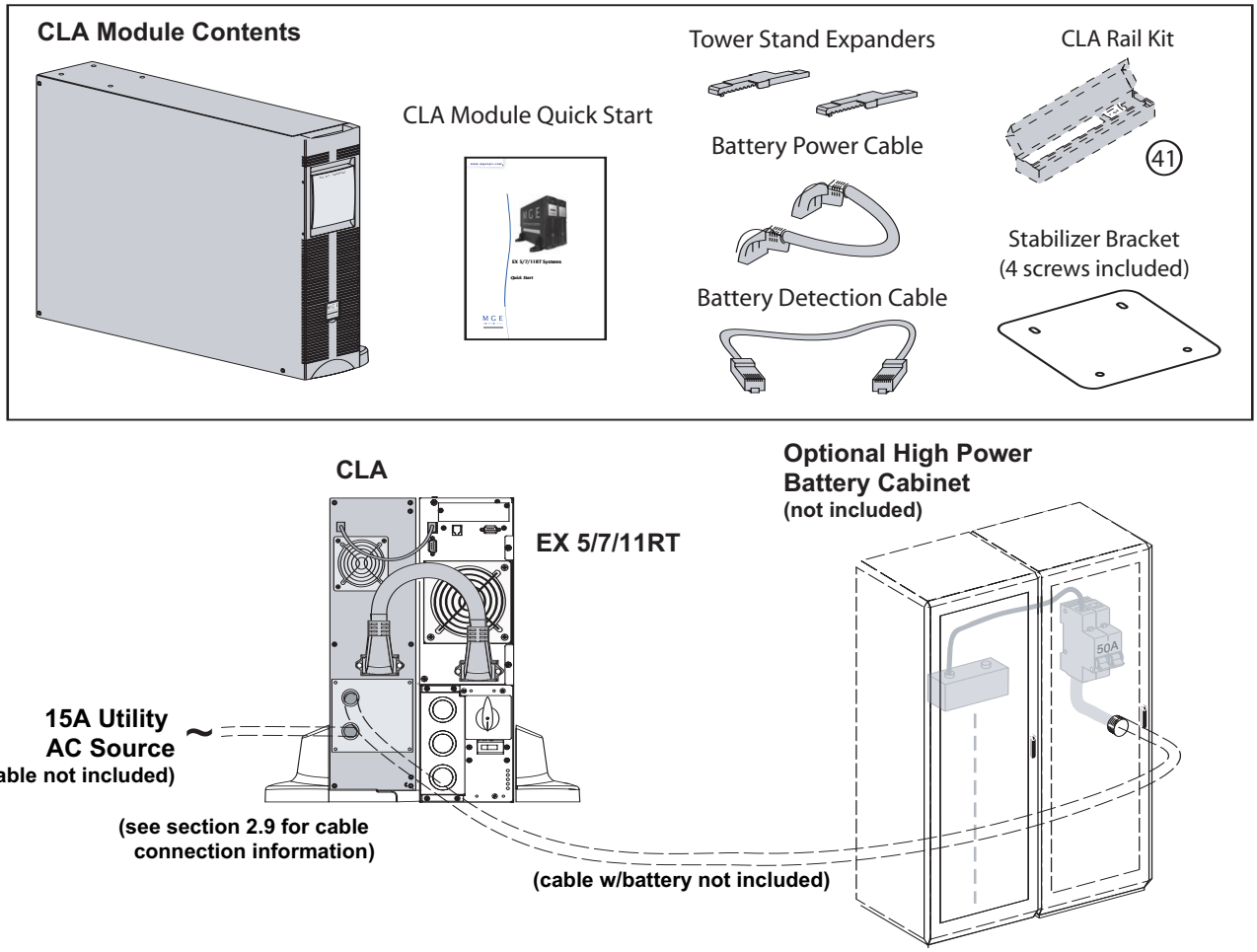


Table 1-7: Battery back-up time chart.

Total battery voltage : 240 VDC (20 x 12VDC, one string).

Battery Back-up Time	Recommended Batteries		
	EX 5RT	EX 7RT	EX 11RT
2 hours	50 Ah	65 Ah	100 Ah
4 hours	100 Ah	130 Ah	200 Ah
8 hours	200 Ah	260 Ah	400 Ah

IMPORTANT **The battery capacity must be set within the UPS (5 Ah increment) See UPS Personalization Section 3.2.**

2.0 Scope

Setup and Installation guides the user through tools and equipment required for connecting the EX 5/7/11 RT, and battery installation or replacement. Included are assembly instructions, power cable connections with wire diagrams for configuring the product to hardware specifications.

2.1 Unpacking and Parts Check

Once the EX 5/7/11 RT systems has been inspected and received from the shipping courier, the unit should be moved to a position as close to the final installation location as possible. See Figures 2-1, on Page 2 — 2.

All Modules are shipped in separate boxes.

Prior to any installation, the following items should be observed upon receipt of the EX 5/7/11 RT.

1. Inspect shipment for any damage prior to receipt. Damage claims should be filed directly with the courier. Replacements for damaged components should be ordered through MGE Office Protection Systems Customer Support Services at 1-800-438-7373.

2. Remove wrapping and foam corners to verify that the equipment nameplate (located on the rear of the units) details a system that corresponds with the equipment ordered.

2.2 Contents of Standard EX 5/7/11 RT Systems

Contents of EX 5/7/11 RT Power Module: (PN 86215 / 86216 / 86217)

(30) EX 5/7/11 RT Power Module.

(31) Two sets of tower stands.

(32) RS232 communication cable.

(33) Product documentation.

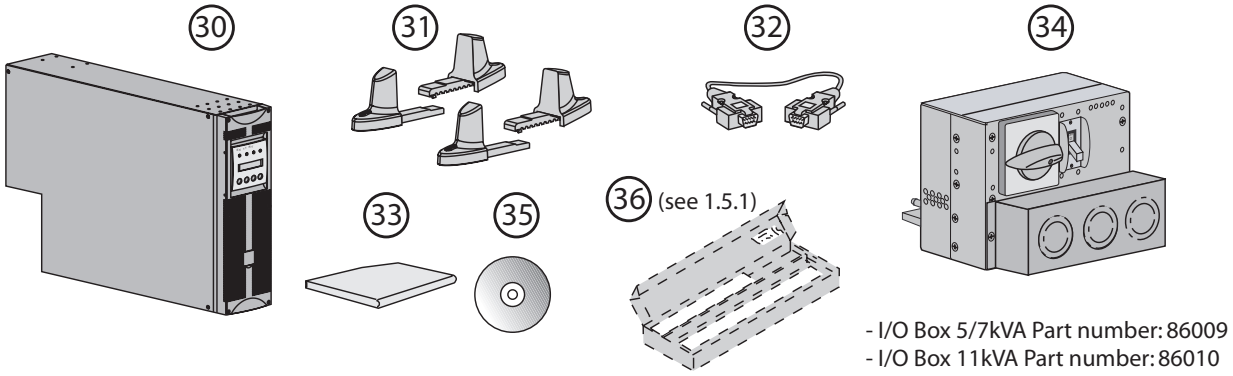
(34) Input/Output Box. (PN 86009 for EX 5/7RT; 86010 for EX 11RT)

(35) Solution-Pac 2 CD.

(36) Power Module Rail Kit, PN 86001.

IMPORTANT **Packaging must be destroyed according to waste management standards. Recycling icons are displayed for easy selection.**

Figure 2-1: Contents of EX 5/7/11 RT Power Module.



Contents of EXB 5/7/11RT Battery Module: (PN 86207 /86209)

(29) Stabilizer Bracket and hardware.

(38) EXB 5/7/11RT.

(39) Tower stand expanders.

(40) Battery Power cable.

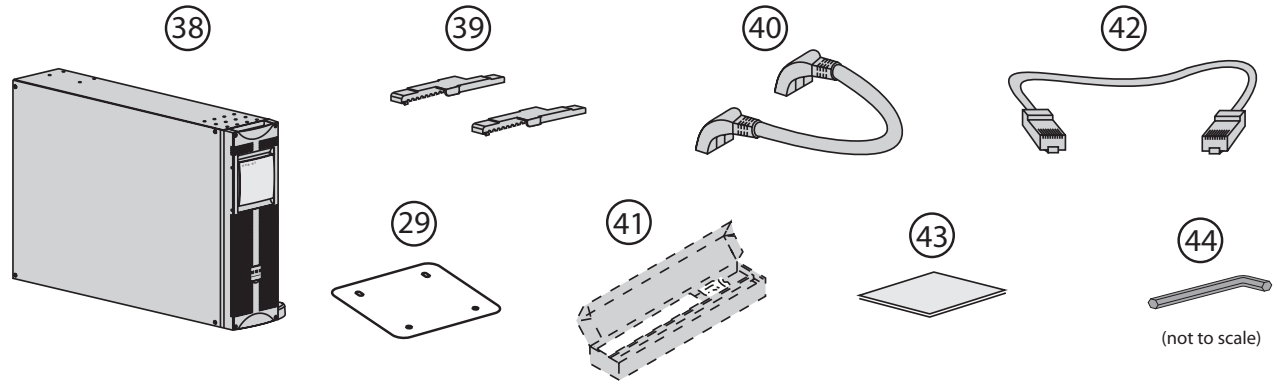
(41) Battery/EX RT Transformer/CLA Module rail kit, PN 86002.

(42) Battery detection cable.

(43) EXB Documentation.

(44) Bezel hex drive.

Figure 2-2: Contents of EXB 5/7/11RT Battery Module.



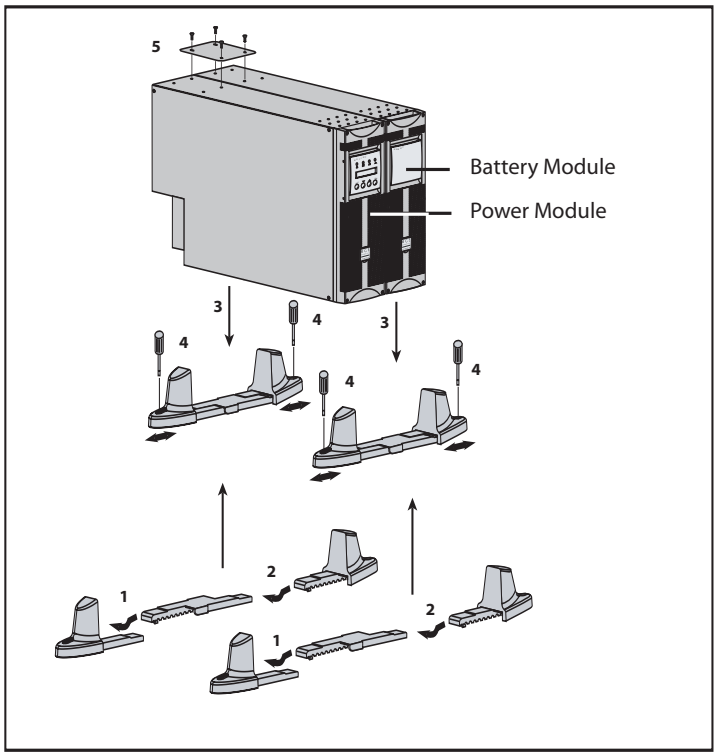
- EXB 5RT Battery Module Part number: 86207.
- EXB 7RT Battery Module Part number: 86207.
- EXB 11RT Battery Module Part number: 86209.

2.3 Installation in Tower Configuration

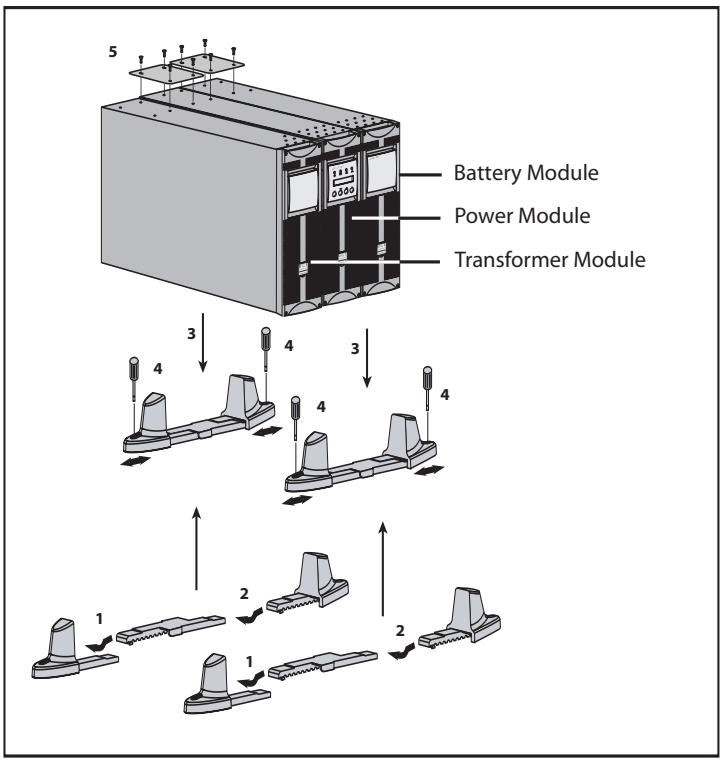
Follow the numerical sequence to assemble tower stands and tower stand expanders, shown in Figure 2-3.

Figure 2-3: Tower Configuration of Standard System and Optional Transformer Module.

Tower Configuration with Standard System



Tower Configuration with Optional Transformer Module



Use the same procedure for tower mounting multiple battery modules, if applicable.

2.4 Installation in Rack Mounting Configuration

2.4.1 Adjustment of Front Panel Logo and Control Panel for Rack Orientation.

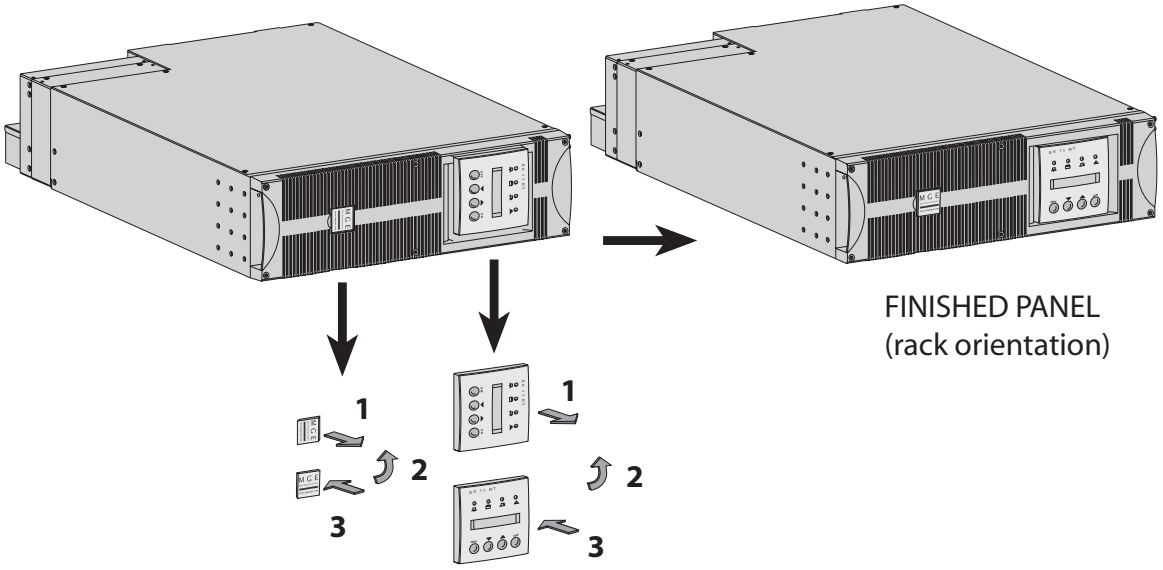
NOTE **If system includes the Transformer Module, we recommend to mount the Battery Module on the bottom, then mount the Power Module above the Battery Module and mount the Transformer Module on top for optimum stability**.

To prepare the front panel logo and LCD display for rack orientation, of all modules. (including Transformer or CLA Module, if equipped).

Proceed as follows:

1. Unclip logo plate and pull the LCD display from front panel.
2. Rotate them 90 degree counter clockwise as shown.
3. Place items back onto the panel.

Figure 2-4: Typical Orientation of the Logo and Control Panel. (Power Module Shown)



2.4.2 Prepare Battery Module for Rack Mounting

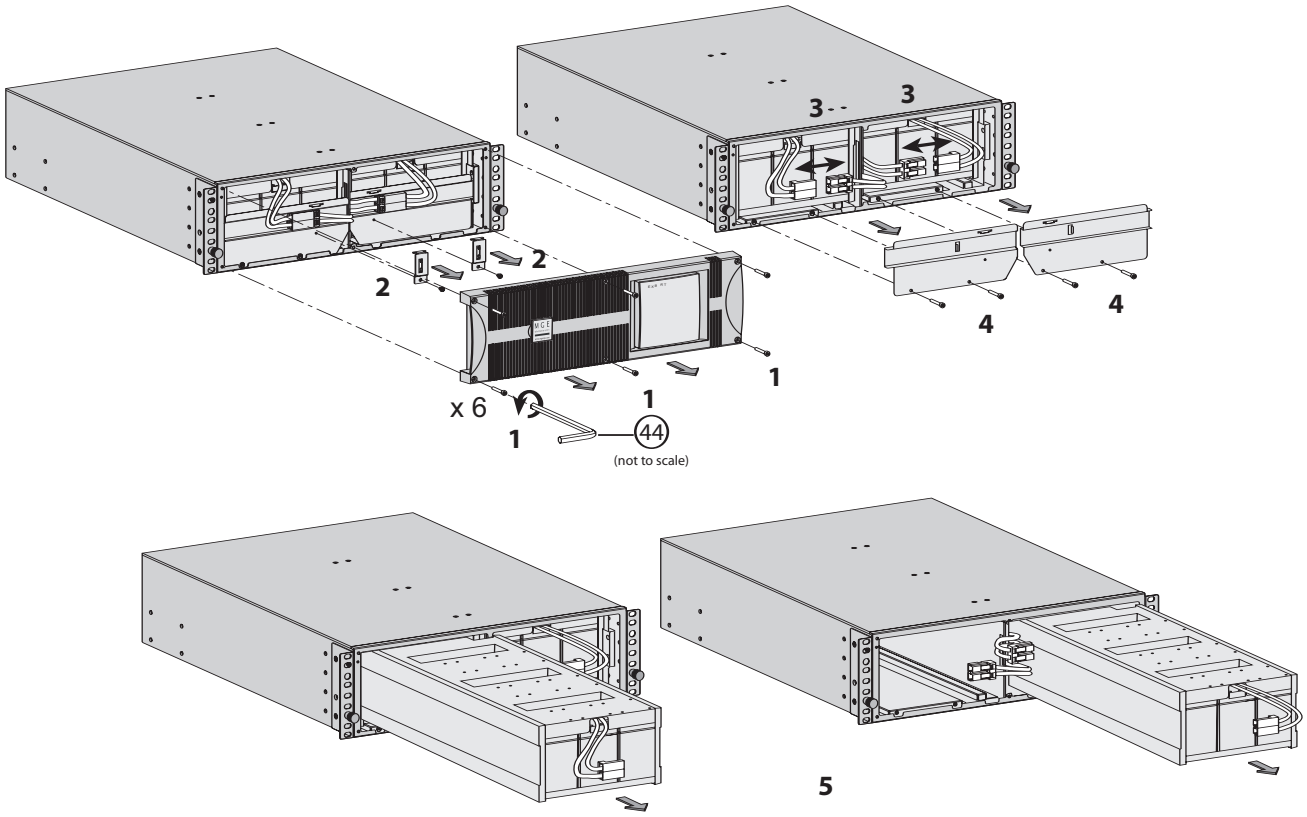
IMPORTANT **This step requires two people.**

The Battery Module is very heavy (151 lbs.). To ease its rack mounting, you can remove the battery pack from the Battery Module, as explained below.

Proceed as follows:

1. Unscrew the six screws securing front panel using Bezel hex driver (44).
2. Unscrew the brackets securing the battery connectors.
3. Disconnect Battery plugs.
4. Unscrew the brackets securing the battery pack. Remove battery bracket pack covers.
5. Pull the left and right battery packs out and set aside for reinstalling after the Battery Module cabinet has been rack mounted.
6. Mount Battery Module cabinet on rack.
7. Re-install the battery pack in reverse order.

Figure 2-5: Accessing Battery Pack.



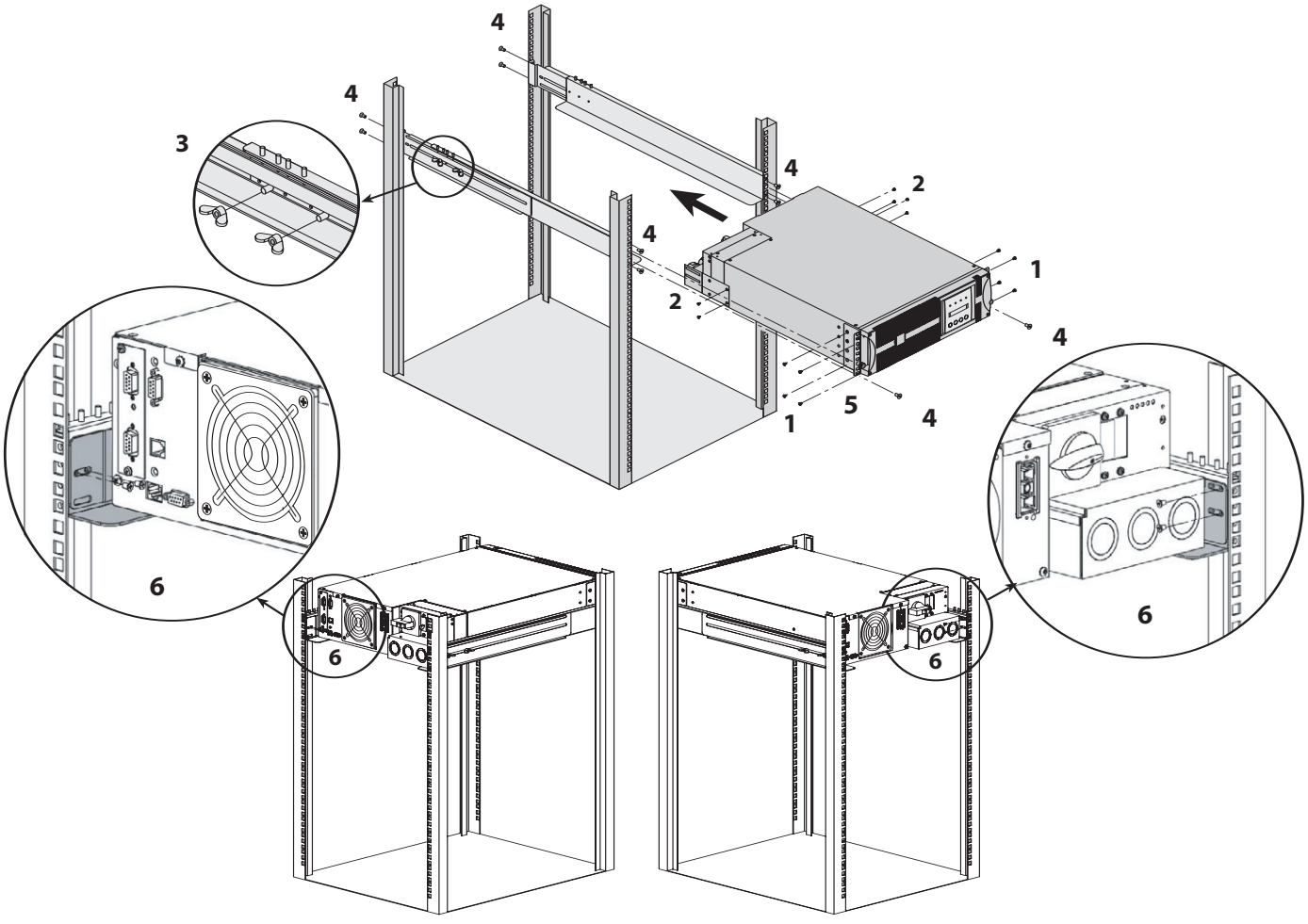
2.4.3 Power, Battery, Transformer, and CLA Charger Module Rack Mounting

The following steps apply to all modules. For simplicity, only Power Module is shown.

Proceed as follows:

1. Attach both front mounting ear brackets (24) to module with supplied screws. (For this step, it is possible to adjust the position of both front mounting brackets.)
2. Attach rear support brackets (25) to module. These brackets prevent the module from sliding out of the rack.
3. Attach rails (26) together, secure with wing nuts, and finger tighten. (both sides).
4. Attach both rails to rear and front of rack with supplied flathead screws (as shown).
5. Use caution when sliding unit into rack. Temporarily secure unit to rack with thumb screws on front mounting brackets.
6. Secure rear support brackets to rails.

Figure 2-6: Rack mounting of the Power Module onto the rails.



NOTE: **This step is unique to the Power Module. It involves the installation of the I/O Box Bracket System.**

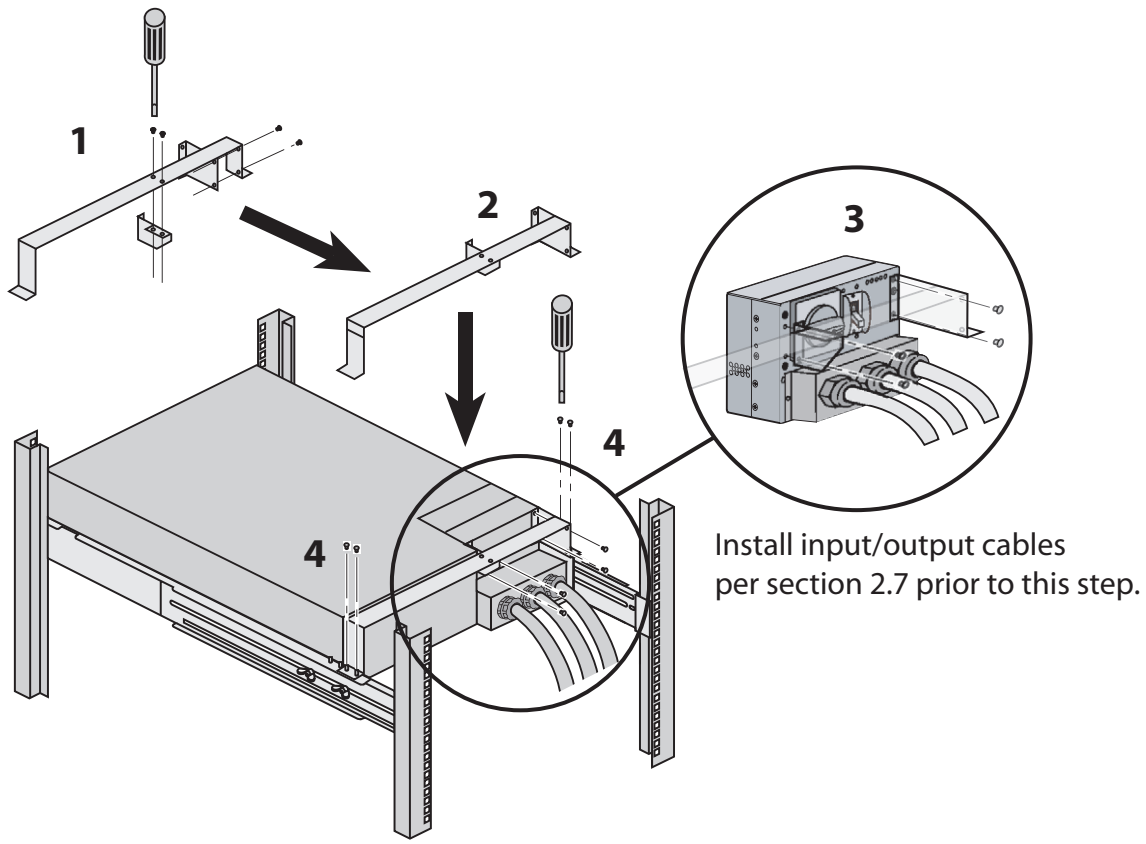
The I/O Box bracket system keeps the I/O Box stationary while hot swapping the Power Module. It will then be easier to slide the replacement module into the connectors of the I/O Box.

1&2. Secure small brackets to larger bracket from the underside (27).

3. Secure small attached brackets to the I/O Box with four screws.

4. Secure large bracket (27) to rails at the rear of module with four nuts.

Figure 2-7: Input/Output Box Bracket System.



2.5 Communication Ports

EX 5/7/11 RT Power Module provides 3 communication method's that can be used simultaneously:

- A female DB9 (5) provides RS232 communications using MGE Office Protection Systems Serial HID UPS Transfer (SHUT)

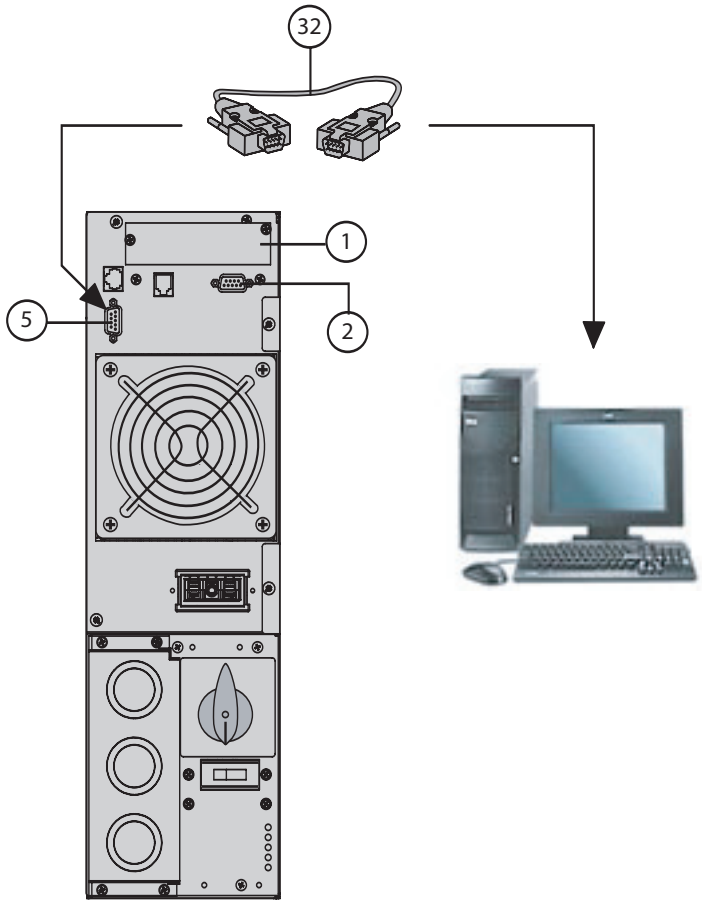
  protocol. This COM Port is compatible with Solution Pac 2 to perform graceful shutdown.
- The Dry Contact Port (2) is used for basic signaling or for protection of IT systems like IBM iSeries (formerly AS400) and more.
- The slot (1) is compatible with most MGE Office Protection Systems Transverse communication card (See Section 2.5.3 or check www.mgeops.com for the complete list of compatible cards).

2.5.1 Connecting the RS232 Communication Port

1. Connect the RS232 (32) communications cable to the serial port on the computer.
2. Connect the other end of the communications cable (32) to the RS232 (5) communications port on the EX 5/7/11 RT.

The EX 5/7/11 RT systems can now communicate with Solution Pac 2 for power management. UPS configuration settings are done by Personal Solution Pac for Windows or through the LCD screen on the front panel (See Section 3.2).

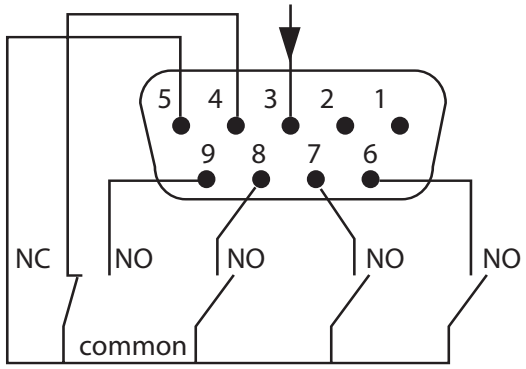
Figure 2-8: RS232 Communication Cable Connection.



2.5.2 Connecting the Dry (Relay) Contact Communication Port (2)

The system status is indicated by the connection of common pin (Pin 5) to the appropriate pins. Refer to the pin explanations below for details.

Figure 2-9: Relay Pin Connections for Communication Port.



When the status is active, the contact between the common (Pin 5) and the relevant information pin is closed.

Pin 1, 2: not used.

Pin 3: Remote Power Off signal (5 to 27 VDC, 10 mA max).

Pin 4: Operation on mains (not on battery). (48VDC, 2A max.)

Pin 5: User common.

Pin 6: Operation on automatic bypass.

Pin 7: Low battery.

Pin 8: Load protected

Pin 9: Operation on battery.

Legend:

NO: contact normally open.

NC: contact normally closed.

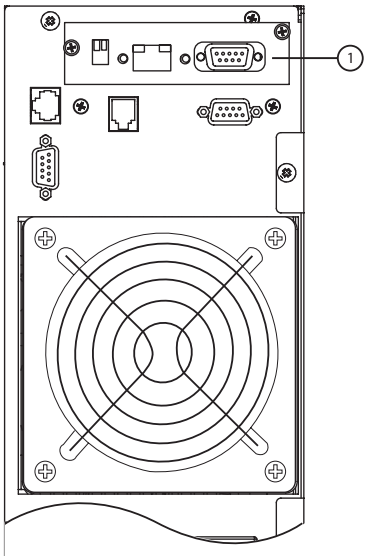
2.5.3 Installation of Optional Transverse Card

It is not necessary to shut down the UPS to install the optional communications card, except for USB card. Following is a typical installation of the Transverse card (optional Network Management card PN 66074 is shown below).

Proceed as follows:

1. Remove the slot cover secured by two screws.
2. Insert the Transverse card into the slot (1).
3. Secure the card with both screws.
4. Refer to user manual of the Network Management Card for set-up.

Figure 2-10: Communication Card Slot with Network Management Card installed.



A wide range of optional cards will allow your UPS to talk to nearly all equipment management systems, making integration faster and easier. All these cards can plug directly into the UPS, saving time and money on your next UPS project. (Meta UPS Card and U-Talk/Basic Acquisition Cards are used exclusively with Multi-slot.)

Dual U-Talk/Basic Card	(PN: 66060) CAN NOT BE USED WITH THIS UPS.
JBus Card	(PN: 66061) Provides RS232 and RS485 connections for using the JBUS/ModBus protocol. Both connections are female DB9. Only one connector can be used for proper operation.
Dual port SHUT Card	(PN: 66066) Has two independent female DB9 communication ports that use Serial HID UPS Transfer (SHUT) protocol. Used with the UPS Control LCD display.
USB Card	(PN: 66067) For direct communications (via USB) with the customer's server and automatic UPS recognition by the power management software of Windows 2000, XP or 2003 Server, or Macintosh OS 9 and 10.
Dual port AS/400 Relay Status Card	(PN: 66068) CAN NOT BE USED WITH THIS UPS.
6 Alarm Relay Card	(PN: 66069) Provides status in the form of 6 Alarm relays (250V 2A rated relays). Connection provided are 12 terminal block wire clips.
XML-Web Card	(PN: 66073) Features a web interface and keeps log files about UPS operation.
Network Management Card	(PN: 66074) Features a web interface, Simple Network Management Protocol (SNMP), Simple Mail Transfer Protocol (SMTP) email notification and keeps log files about UPS operation.
Environmental Sensor	(PN:66846) For Network Management Card: Monitors temperature, humidity, and status of 2 dry contact inputs.

2.6 Remote Emergency Power Off (REPO) Communication Port (3)

The end user is responsible for the installation of a Remote Emergency Power Off function. Installation must be carried out in compliance with local code regulations.

To shutdown the entire system completely in case of emergency:

- Disconnect the AC input to the Power Module by opening up the upstream circuit breaker connecting the utility power to the Power Module.
- Turn off the circuit breaker of the Battery Module connecting to the Power Module.
- Turn off the circuit breaker of the subsequent Battery Modules, if applicable.

All these steps above should be performed via a single device.

To simplify the last two steps, the Power Module provides an RJ-11, six contact connector on the back panel, called Remote Emergency Power Off (REPO) port. Upon applying a voltage source (5-27VDC, 10mA max.) to pins 2, 4 of this port, the Power Module will send a signal to trip off the shunt trip on each circuit breaker of all Battery Modules via the battery detection cable simultaneously. Refer to the diagram below for details.

Figure 2-10a: Activation of Remote Emergency Power Off function using a contact normally open switch.

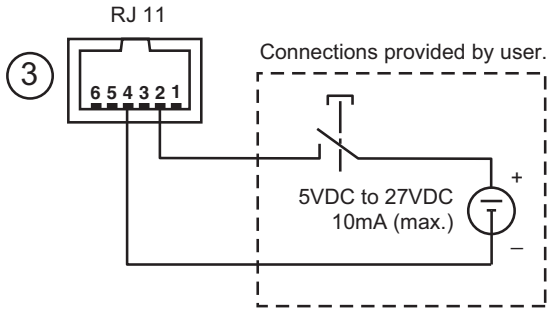
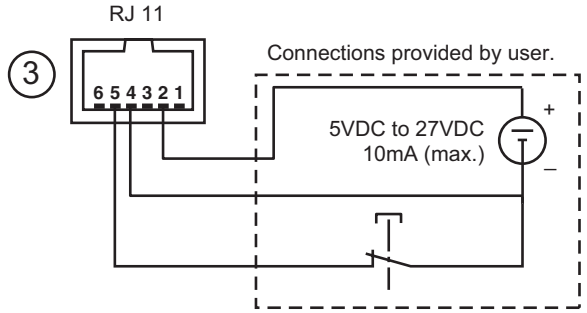


Figure 2-10b: Activation of Remote Emergency Power Off using a contact normally closed switch.



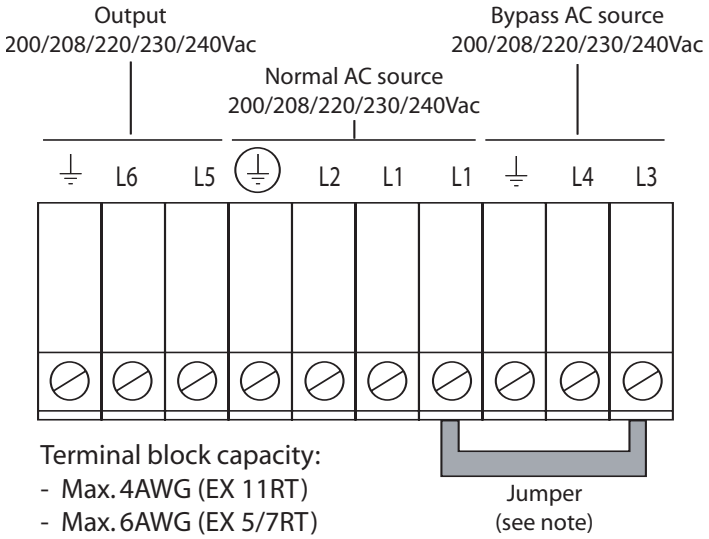
2.7 System Connections

WARNING

This type of connections must be carried out by qualified electrical personnel. Before carrying out any connections, check that battery circuit breaker (14) is OFF and that the upstream protection devices (Normal and Bypass AC sources) are open (OFF/OPEN).

2.7.1 Connections with Common Normal and Bypass AC Sources (Single Mains)

Figure 2-11: Power Module I/O Box Terminal Block Diagram.



Terminal tightening torque:
– 18 lb-in. for EX 5/7RT Power Module
– 35 lb-in. for EX 11RT Power Module

NOTE

- **The Power Module is factory configured for single input, whereas both Normal AC and Bypass AC sources are identical, by means of jumper between L1 and L3.**
- **Jumper must be removed for separate Normal AC and Bypass AC sources (2 Mains) or with Frequency Converter application.**
- **Keep Manual Bypass Switch (7) at Normal position.**

Proceed as follows:

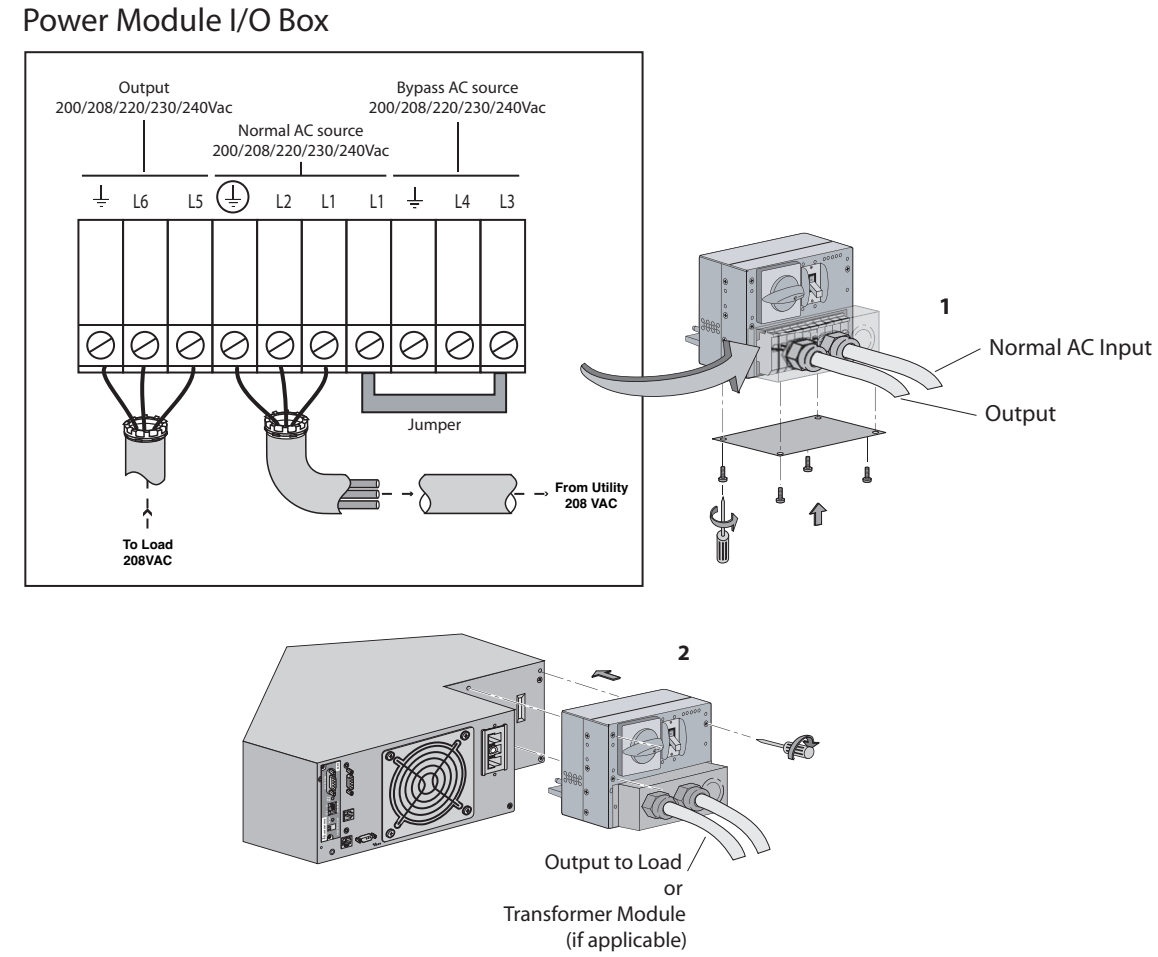
1. For normal AC input, make connections to L1, L2, and ⏚ terminals only. No connections are required for Bypass AC input. Make connections to ⏚, L5, L6 terminals for output.

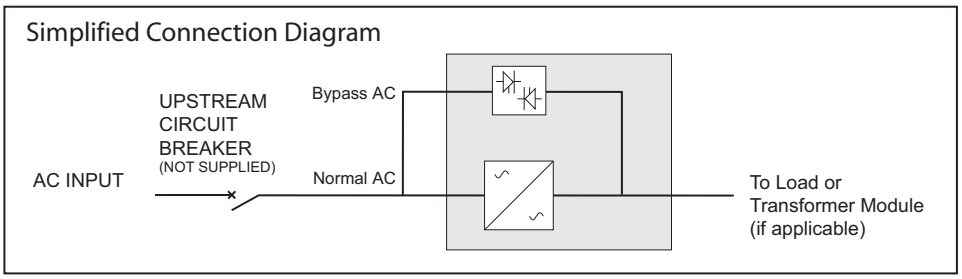
CAUTION: **Always connect the earth ground wire first.**

Jumper must be between L1 and L3. System is factory configured for 208VAC output.

2. Attach I/O Box to the Power Module with three screws.

Figure 2-12: Normal AC Input and Output Cables Installation.



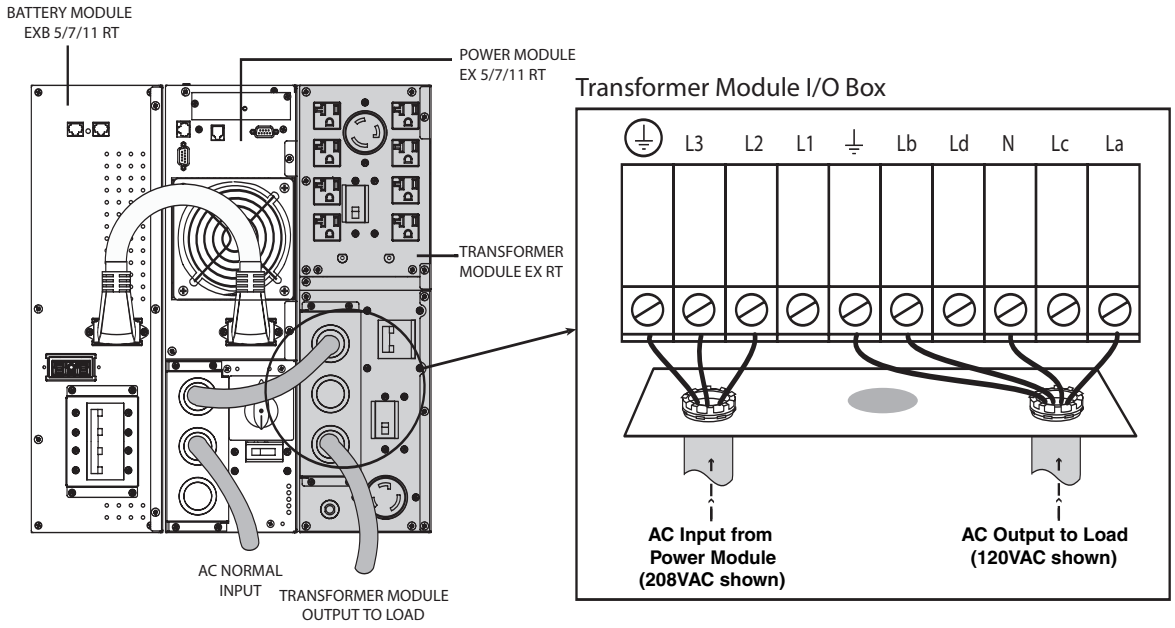


2.7.2 Connecting EX RT Transformer Module

Part number 86211/86311

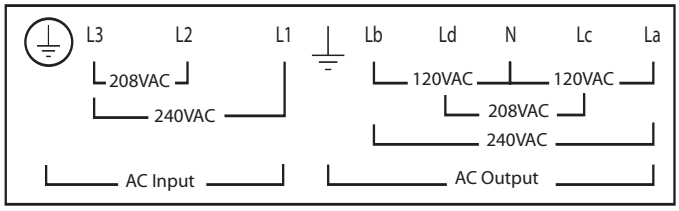
This module is to provide isolated 120/208/240 VAC outputs to the protected loads.

Figure 2-13: View of EX RT Transformer Module connected downstream for 120/208/240 Vac outputs (shown with one EXB).

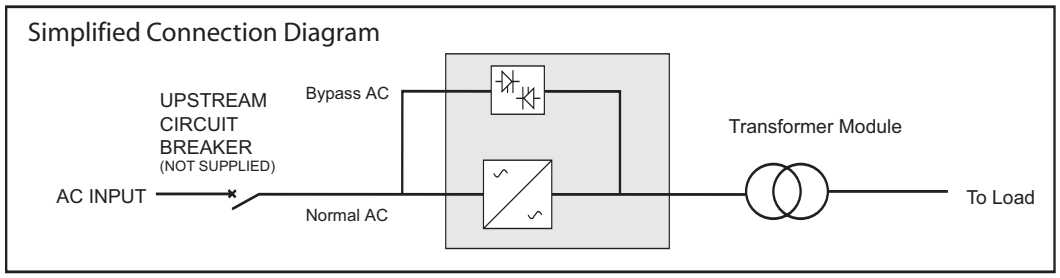


WARNING **To avoid overloading 120VAC output windings, distribute loads evenly between Load 2 and Load 4 (on rear of Transformer Module) and between 120VAC output terminals (Lb-N, La-N.)**

Terminal Block Transformer Module Connection diagram
(located on bottom of Transformer I/O Box)



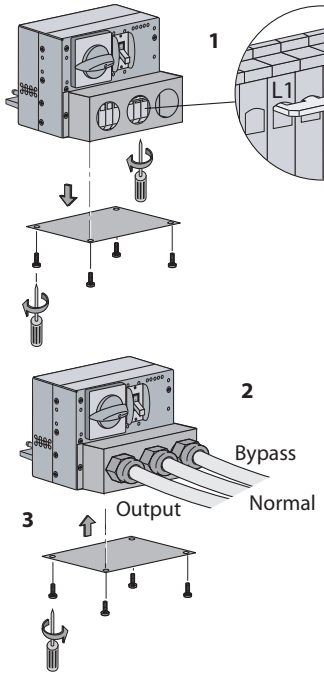
Terminal Block capability:
AWG 4 solid or stranded wire.



2.7.3 Connections with Separate Normal and Bypass AC Sources (2 Mains)

CAUTION: **This connection requires isolation Transformer Module. Please visit our web site www.mgeops.com or call (800) 279-7776.**

Figure 2-14: Normal AC and Bypass AC inputs, Output Cables Installation, and Simplified Connection Diagram.



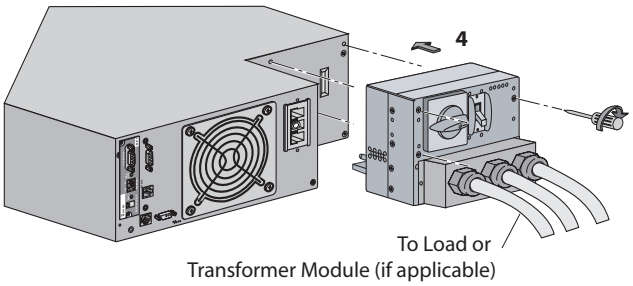
Proceed as follows:

1. Remove the cover plate under the I/O Box. Loosen the terminal blocks L1 and L3, and remove the jumper.

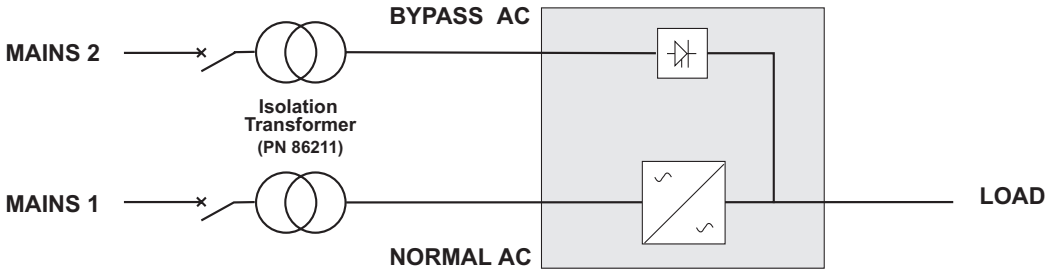
CAUTION: **Always connect the earth ground wire first.**

2. Install Normal AC, Bypass AC and output cables as shown.
3. Reinstall the cover plate under the I/O Box with four screws.
4. Secure the I/O Box to the Power Module with three screws.

See Section 2.7.2 for connecting EX RT Transformer module, if applicable.



With separate Normal and Bypass AC inputs, supplied by separate sources.

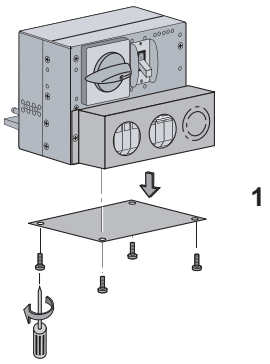


NOTE: **Please visit our web site www.mgeops.com or call (800) 279-7776 for assistance with separate, normal AC, and bypass AC input support.**

NOTE: **With parallel redundance connection, two input transformers are needed for separate, normal, and AC bypass input. Please visit our web site www.mgeops.com for details.**

2.7.4 System Connections as Frequency Converter (without Bypass AC source)

Figure 2-15: Accessing Terminal Blocks for Input and Output Power Cables.



CAUTION: Always connect the earth ground wire first.

1. Remove the cover plate under the I/O Box.

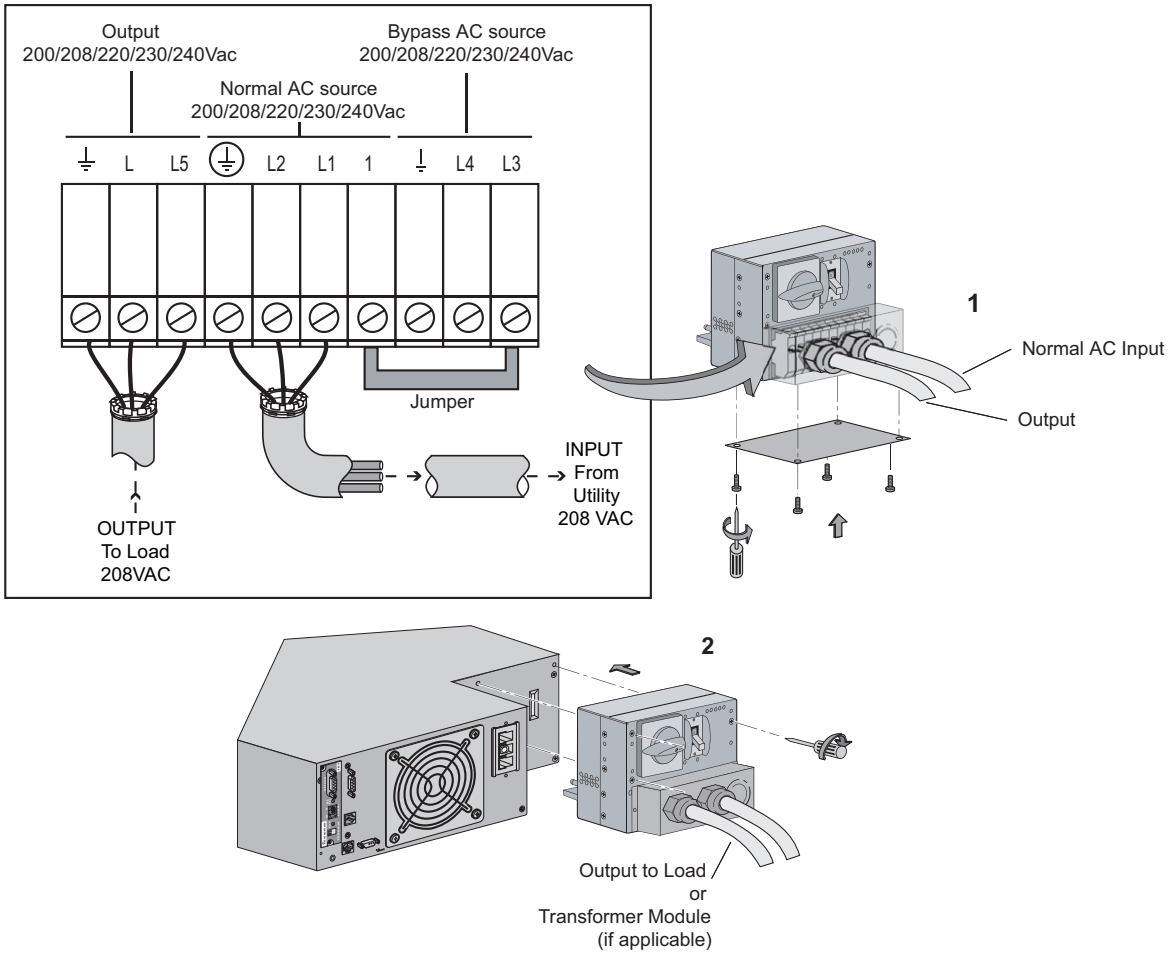
   Remove the jumper connecting L3 and L1.

CAUTION: Removing the jumper will disable the Bypass AC source. Do not connect anything to the Bypass AC terminal block.

2. Refer to Section 2.7.1 to install Normal AC source and output wires per I/O Box Terminal diagram. Re-install the cover plate under the I/O Box.
3. Secure the I/O Box to Power Module with three screws.

   See Section 2.7.2 for connecting EX RT Transformer Module, if necessary.

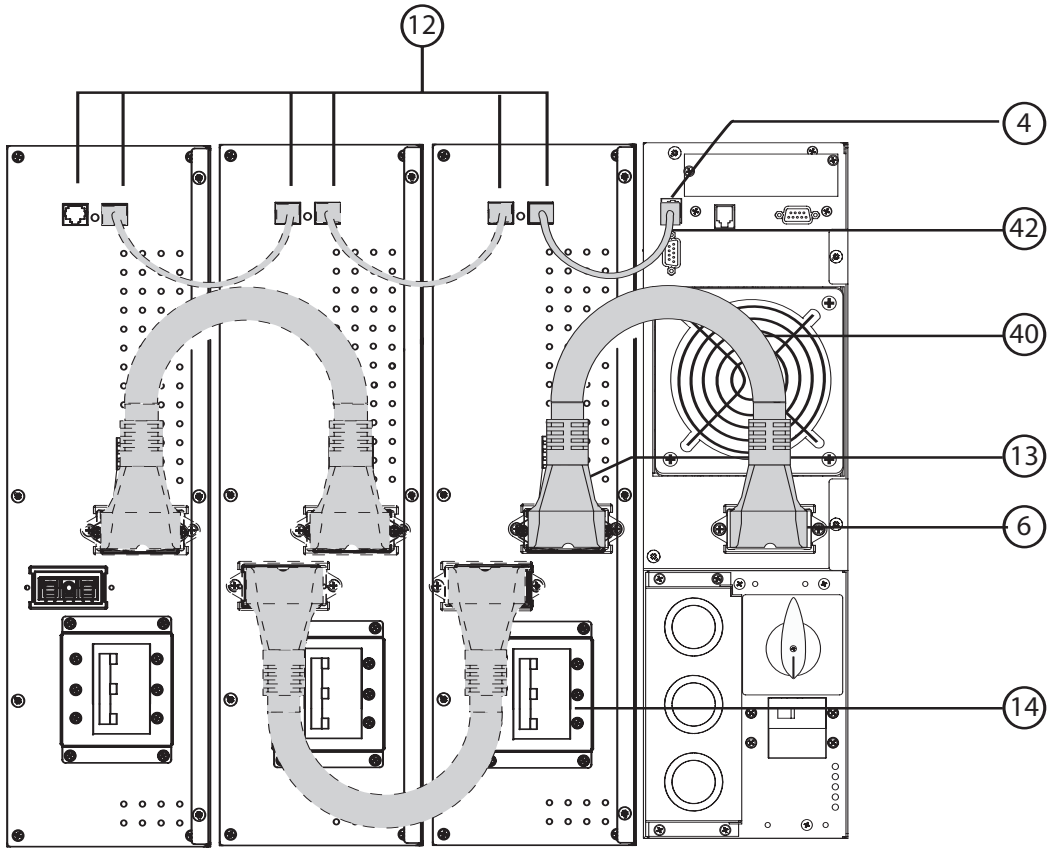
Power Module I/O Box



2.8 Connection of Battery Module EXB

1. Check that the battery circuit breaker (5) (14) is OFF (“0”) position.
2. Connect the battery power cable (40) to the connectors (6) and (13) of the Power and Battery Modules.
3. Connect the battery detection cable (42) between connectors (4) and (12) of the Power and Battery Modules.

Figure 2-16: Rear view of Battery Module cable connections.



2.9 Connection of Optional CLA Module

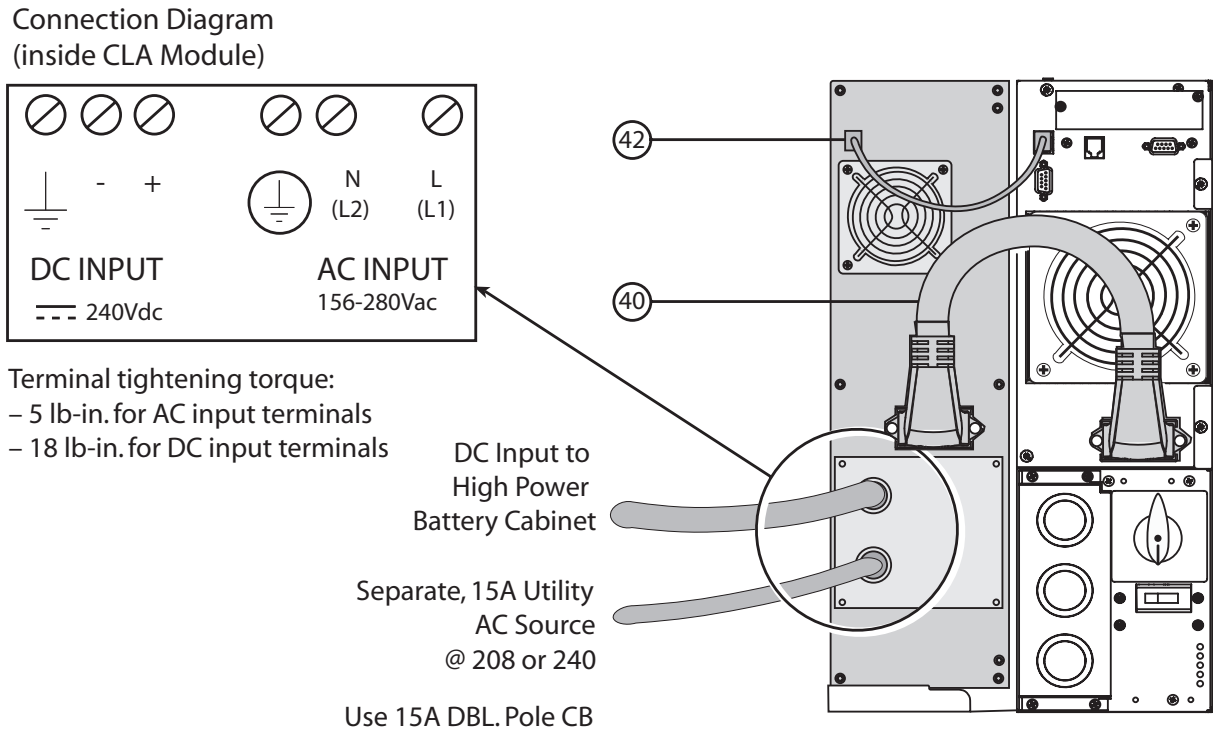
1. Connect the battery power cable (40) and battery detection cable (42) (provided with the CLA Module) between the Power Module and the CLA Module.
2. Connect the DC Input of the CLA Module to high power battery cabinet.
   - ◗ DC Input Cable cross-section (not provided): maximum 4 AWG solid or stranded wire.
3. Connect the utility AC input to terminal blocks L1 and L2 of the CLA.
   - ◗ AC input cable cross-section (not provided): maximum 16 AWG solid or stranded wires.

Field wiring connections to terminal block shall be made using the following:

– No. 14 AWG, 60ºC copper wires for AC inputs.

– No. 10 AWG, 75º C copper wires for DC inputs.

Figure 2-17: Rear view of CLA Module cable battery and AC input connections



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3.0 Scope

Operation describes EX 5/7/11 RT systems characteristics of indicators and controls, modes and specifications and theory of operating the EX 5/7/11 RT. The user procedures include performing software programming that will maintain smooth performance. Refer to Figure 1.6 for descriptions of circled numbers.

3.1 Initial Startup

NOTE **Both AC and DC sources must be present for normal startup of EX 5/7/11 RT systems. If the system is configured for cold start, the AC and DC sources are required for initial startup only.**

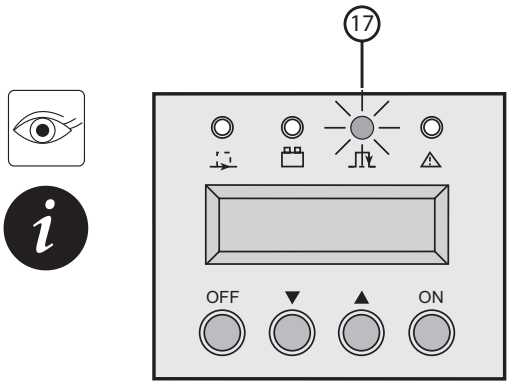
1. Check that the manual bypass switch (7) is on Normal position.
2. Set the Normal AC source circuit breaker (8) to the ON position.
3. Set the battery circuit breaker (14) to the ON position.

The load is powered via the Bypass AC source, but not protected by the UPS.

Batteries are recharging, an eight-hours recharge period is necessary to get full back-up time.

LED (17) is ON.

Figure 3-1: Initial Startup Display.



3.2 UPS Personalization

WARNING **Before changing items from Tables, 3-1, 3-2, 3-3, and 3-4, the UPS system must be turned OFF.**

IMPORTANT **If specific settings are required, it is recommended to enter the UPS personalization mode at this stage.**

It is possible to enter this mode through the front panel buttons or the Solution-Pac 2 software for Windows included in the MGE Office Protection Systems Solution-Pac 2 CD-ROM.

3.2.1 Accessing personalization with front panel buttons

- Press "scroll down" (21) and "scroll up" (22) function buttons together for more than 3 seconds.
- Press the function button (22) placed under the “ENT” word to enter the set up mode and follow the LCD messages using the buttons now defined as select keys. See Tables: 3-1, 3-2, 3-3, and 3-4 for settings.

Figure 3-2: Control Panel with scroll up and down buttons.

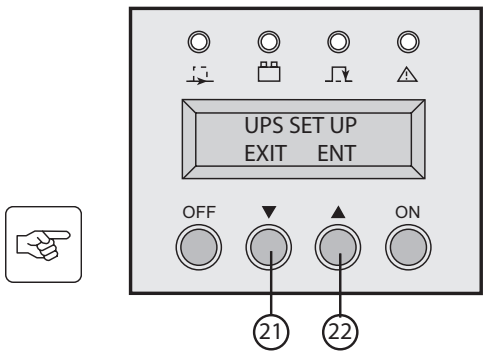


Table 3-1: Local Settings.

Display	Factory setting	Options
Language	English	French, Spanish, German, Italian
Date/time format	International	US
Date/time change	(DD-MM-YYYY/HH:MM)	MM-DD-YYYY/HH:MM adjustable
Audible alarm	Quick beeps	Slow beeps

Table 3-2: Output Features.

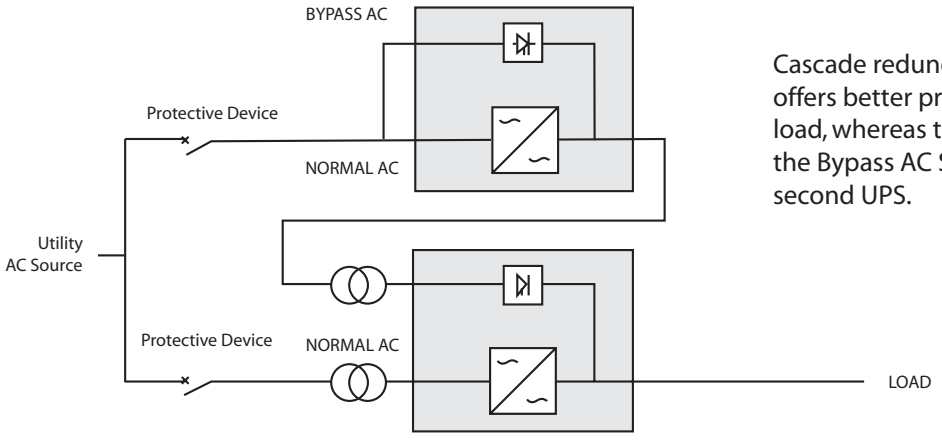
Display	Factory setting	Options	Comments
Output voltage	208 Volts AC (***)	200/208/220/230/240/250	Input voltage must be equal to output voltage
Frequency converter	Disabled	Enabled	Bypass AC source disabled
Output frequency	Auto ranging	50/60 Hz	User selectable under frequency converter mode
ECO mode	Disabled	Enabled	See Section 3.4.2.
Hot standby	Disabled	Enabled	Cascade (See Figure 3-3)
Operating mode	Industrial	IT Network	(*) See Table 3-5.
Bypass Transfer	When bypass NOK	When bypass OK (**)	(*) See Table 3-5.
Interrupt time	10 ms	10 to 200 ms (by steps of 10 ms)	Interrupt time calibration during during load transfer when Bypass AC source is out of tolerances
Overload level	102%	50/70%	

(*) : - Select "IT Network" for computer loads. Select “Industrial” for other applications or when there exists and absolute need for service continuity (with potential 10msec. interrupt) when Bypass AC source is not within set tolerances. See Table 3-5 for more details.

(**) UPS will switch to Bypass AC Source if it is within the set tolerances.

(***) Input voltage must be equal to output voltage.

Figure 3-3: Configuration used to provide cascade redundancy to critical loads.



Cascade redundancy configuration offers better protection to critical load, whereas the first UPS acts as the Bypass AC Source for the second UPS.

Table 3-3: ON/OFF Features.

Display	Factory setting	Options	Comments
Cold start	Disabled	Enabled	Start on battery.
Forced reboot	Enabled	Disabled	UPS restarts automatically when normal AC source is restored.
Automatic restart	Enabled	Disabled	UPS restarts automatically when normal AC source is restored.
Sleep mode	Disabled	Enabled	Automatic shutdown on battery if output load level <10%
Remote Command	Enabled	Disabled	Enables shutdown or restart orders from software.

Table 3-4: Battery Features.

Display	Factory setting	Options	Comments
Battery test	Every week	No test/daily/monthly	
Pre-Alarm	20%	0 to 100%	Low battery signal;1% increment
Runtime choice	UPS reads # and type of Battery Modules connected.	From 50 to 400 Ah	Requires CLA Module if using options (See Section 1.5.8)
Battery deep discharge protection	Enabled	Disabled	If disabled, loss of MGE Office Protection Systems warranty.

3.3 Information Technology IT Network and Industrial Operating Modes

Table 3-5: System Operation in IT Netowrk and Industrial Modes.

Symptoms	IT Network mode	Industrial mode
Overload, and Bypass source in tolerance.	Load is transferred to Bypass AC source. UPS returns to normal mode if overload is removed.	Same as IT Network mode, but AC to the UPS does not return to normal mode if overload is removed.
Overload, and Bypass AC source not in tolerance.	The UPS shuts down and load is not transferred to Bypass AC source.	Load is transferred to Bypass AC source with 10 milli-seconds output break. The UPS does not return to normal mode if overload is removed.
Output short circuit and Bypass AC source in tolerance.	The load remains powered by the UPS. The UPS shuts down after 3 minutes if the short circuit remains.	Load is transferred to Bypass AC source. The UPS does not return to normal mode if the short circuit is removed.
Output short circuit and Bypass AC source not in tolerance.	The load remains powered by the UPS. The UPS shuts down after 3 minutes if the short circuit remains.	The load is transferred to Bypass AC source with 10 milliseconds output break. The UPS does not return to normal mode if the short circuit is removed.

3.3.1 UPS personalization through external software

Insert the **Solution-Pac 2** CD ROM in your CD drive.

- At the first Navigator Screen, select "**Installation**" and follow the instructions to install **Solution-Pac 2** for Windows.
- If nothing appears, launch startup.exe
- Then go to "**Advanced settings**" and "**UPS settings**".

Please note that the Linux/Unix/MacOS versions of **Personal Solution-Pac** do not include this feature.

3.3.2 Final Startup sequence

Press the <**ON**> button more than 3 seconds.

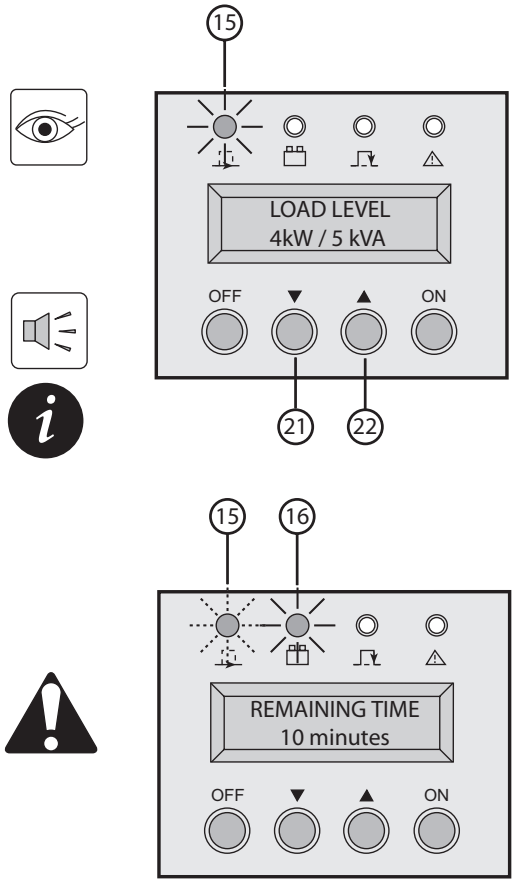
- After UPS internal test sequence, the green LED (15) goes on.

CAUTION **During the startup, if the Bypass AC source is out of tolerance, there will be a 10msec output interrupt.**

3.4 Operating Modes

3.4.1 Normal (Double Conversion) Mode

Figure 3-4: Normal (Double Conversion) Mode.



This is the standard operating mode, set by the factory.

Two possible cases.

1. If Normal AC source available:

(15) LED is ON.

The load is protected by the UPS.

Scroll down (21) or scroll up (22) function buttons allow you to read the UPS measurements (Normal AC source voltage, Bypass AC source voltage, operating mode, battery capacity and UPS Serial Number).

2. If Normal AC source not available:

CAUTION: **Do not operate the Manual Bypass switch when the UPS is in Normal mode.**

(15) LED flashes.

(16) LED is ON.

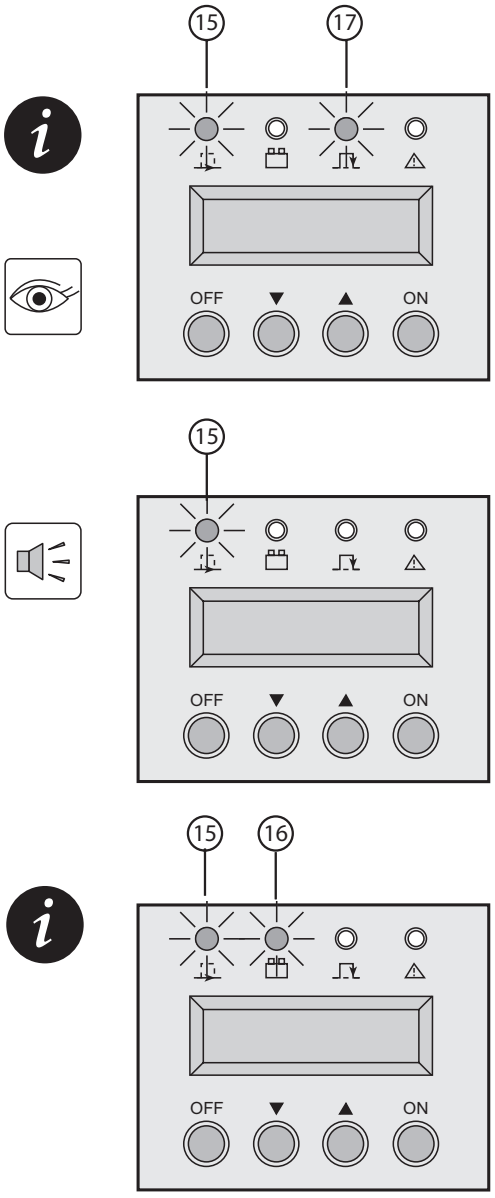
The audible alarm sounds intermittently.

The load is now powered by the UPS battery.

This display shows remaining back-up time.

3.4.2 ECO Mode

Figure 3-5: ECO Mode Display.



The main advantage of the ECO mode is that it reduces the consumption of electrical power by not running in the online mode. When this mode is selected, the system works as an offline UPS system, powered by Bypass source if Bypass source is inside user's defined range. Outside this range, the UPS system will switch to online mode with 10ms interrupt.

Three possible cases:

1. If Normal AC source (Mains 1) and Bypass AC Source (Mains 2) are available:

   (15) and (17) LED are ON.

The load is supplied with AC power but not protected in ECO mode.

2. If Normal AC source (Mains 1) is available, but Bypass AC source (Mains 2) is not available:

   (15) LED is ON.

The audio alarm sounds intermittently.

The load is automatically supplied in Normal mode via the Normal AC input.

3. Both Normal and Bypass AC sources not available or out of tolerance:

   (15) LED is ON.

   (16) LED is ON.

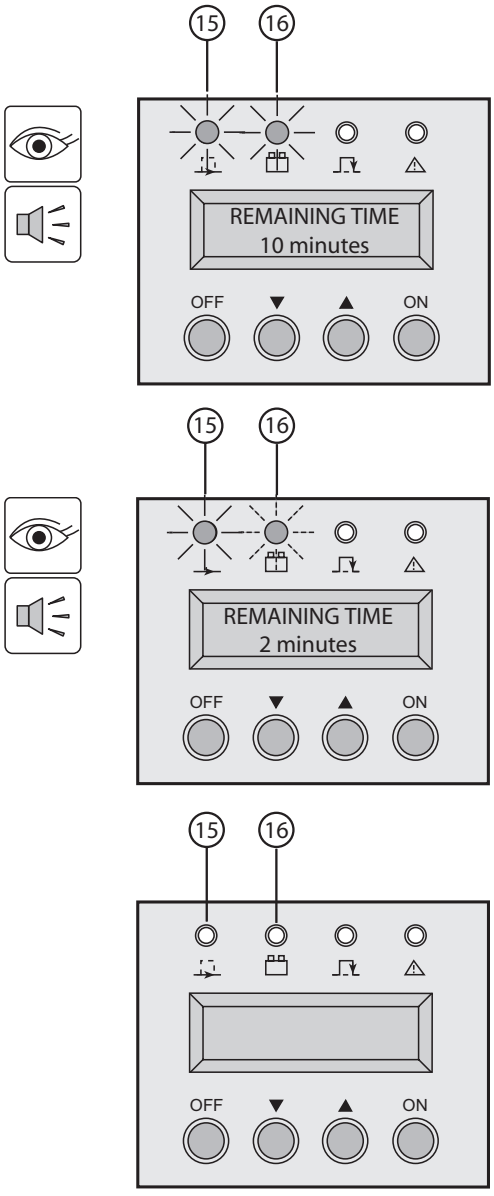
The audio alarm sounds intermittently.

The load is powered by the battery power from the UPS.

The LCD display indicates the battery remaining back-up time.

3.5 Operation on Battery Power

Figure 3-6: Transfer, Threshold and End of back-up time.



3.5.1 Transfer to Battery Power

The load continues to be protected by the UPS when the Normal AC source is not available. Power is supplied by the battery.

There are three possible cases:

First Case: Operation on battery

(15) LED is ON.

(16) LED is ON.

The audio alarm beeps every 10 seconds.

- This indicate the load is supplied by the battery.
- The LCD display indicates the battery remaining back-up time.

Second Case: Low battery warning

(15) LED is ON.

(16) LED flashes.

The audio alarm beeps every 3 seconds.

- Low battery warning on LCD display. There is very little remaining battery back-up time. Close all applications because UPS automatic shutdown is pending.

Third Case: End of back-up time

(15) LED is OFF.

(16) LED is OFF.

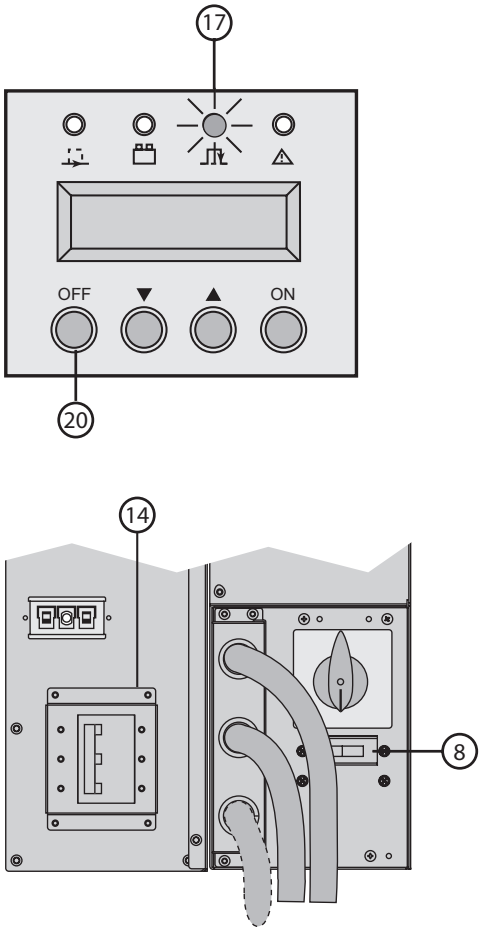
The audio alarm is stopped.

3.6 Return of Normal AC source

After an outage, the UPS restarts automatically when AC power is restored (unless this function has been disabled via UPS personalization).

3.7 Shutdown

Figure 3-7: Shutdown Display, Circuit Breaker, and AC Source Switch.



1. Press the OFF button (20) more than 3 seconds.

CAUTION: The load is no longer protected by the UPS. It is powered via the Bypass AC source. If the UPS is set in frequency converter mode, the load will not be powered.

If the Bypass AC source is out of tolerance, the UPS will generate a calibrated 10msec output interrupt.

2. Set the battery circuit breaker(s) (14) to the OFF position.

3. Set the Normal AC source circuit breaker (8) to the OFF position.

   LED (17) is now OFF.

CAUTION: Performing this step will disconnect power to the load.

4. For the complete shutdown of the UPS (no input and output power), the upstream circuit breaker (not included) should be set to the OFF position.

4.0 Scope

Maintenance includes a troubleshooting guide of symptoms and possible solutions, hot swapping the Power Module and Battery Module, and testing scenarios.

4.1 Troubleshooting

- If any of LEDs (17) or (18) is on, there is an operating anomaly or an alarm.
- Use "scroll up" or "scroll down" function button to reset the audible alarm.

Table 4-1: Troubleshooting Not Requiring MGE Office Protection Systems After-Sales Support.

Symptoms	Indication	Correction
LED (17) is on, and Bypass AC source is present the LCD display shows BAD CONNECTION REWIRE AC NORMAL	AC source is not connected to the correct terminals.	Rewire correctly to the Normal AC source.
LED (17) is on, the LCD display shows: LOAD LEVEL XX kW / XX KVA	Load supplied by Bypass AC source.	Push the ON button for more than 3 seconds.
LED (17) is on, and Bypass AC source is present the LCD display shows: THERMAL OVERLOAD 1XX%	UPS overload	Check if any device is shorted or failed.
LED (18) is on, the LCD display shows: CURRENT OVERLOAD	Short circuit conditions on output devices.	Check if any load has shorted or failed.
LED (15) is on, but the LCD display shows: BYPASS REVERSE REWIRE BYPASS	180° degree phase shift between bypass and normal AC source.	Check if Bypass source is correctly wired (in case of upstream transformer use).
Audible alarm is on, the LCD display shows: I/O BOX REMOVED	Input/Output box not installed correctly.	Check if the Input/Output box is correctly installed. See Section 2.7. Check for correct I/O Box.

Table 4-2: Troubleshooting Requiring MGE Office Protection Systems After-Sales Support.

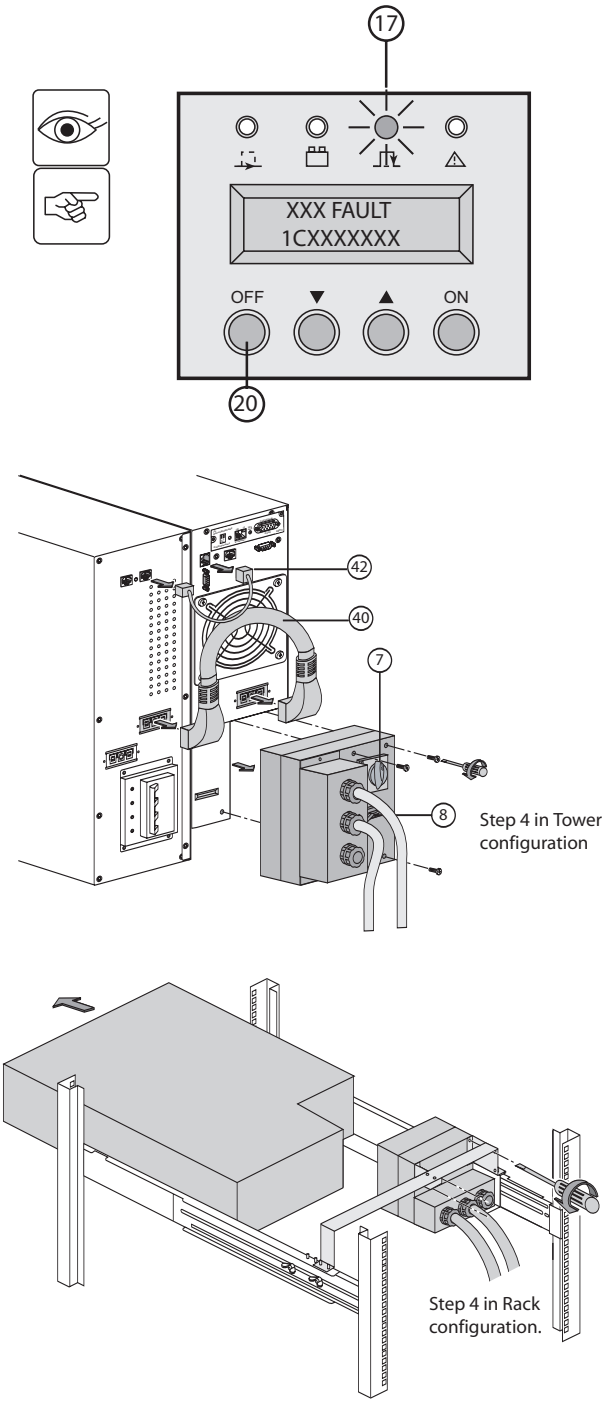
Symptoms	Indication	Correction
LED (17) and (18) are on, Bypass AC Source is present and audible alarm is on. the LCD display shows: xxx FAULT	Internal fault and transfer of load on Bypass AC source	Please visit www.mgeops.com or call (800) 279-7776 for technical support
LED (17) is on, and audible alarm is on, the LCD display shows BATTERY FAULT	Battery fault during the battery test.	Follow the battery replacement procedure in Section 4.4.
LED (17) is on, the LCD display shows: SHUTDOWN STATIC SW FAILED	Static switch failure	Please visit www.mgeops.com or call (800) 279-7776 for technical support
Audible alarm is on, the LCD display shows: BATTERY CHECK	Batteries may have exceeded their rated life period. Battery capacity is severely reduced.	Follow the battery replacement procedure in Section 4.4.

NOTE: To reset the alarm permanently, press both function buttons (21) and (22) for more than 3 seconds.

4.2 Hot Swapping the Power Module

This operation can be performed without interrupting the load.

Figure 4-1: Disconnecting the Power Module.



1. Stop the system with the OFF button (20) (press more than 3 seconds). System is now powered by Bypass AC source.

   Check if UPS is on Bypass AC source by verifying that:

   LED (17) is ON (If LED (17) is not ON, do not turn the manual bypass and visit www.mgeops.com or call (800) 279-7776.

2. Turn the manual bypass switch (7) to the BYPASS position.

3. Switch the battery circuit breaker(s) (14) to the OFF position.

   CAUTION: Do not switch the Normal AC source circuit-breaker (8) to the OFF position. Doing so will disconnect power to the load.

4. Loosen three screws to remove the Input/Output box.

5. Disconnect the battery cables (40) and (42) from the Power Module.

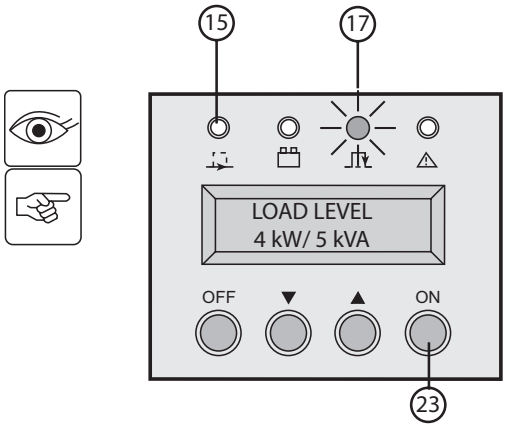
The Power Module can be replaced.

The connected equipment is powered by the Bypass AC source.

4.3 Re-Connecting the Power Module

This operation can be performed without interrupting the load.

Figure 4-2: Reconnect the Power Module.



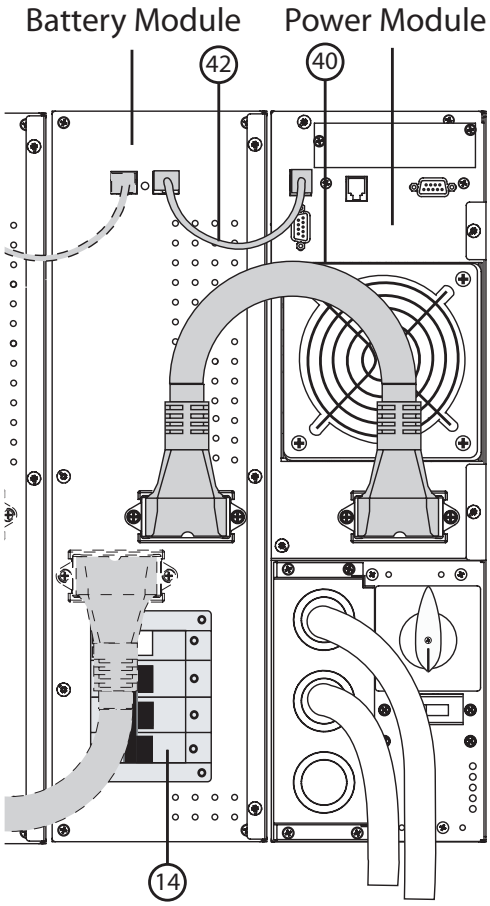
1. Secure the Input/Output box using the three screws.
2. Reconnect the cables (40) and (42) to the Power Module.
3. Switch the battery circuit breaker(s) (14) to the ON position.
4. Check if Normal AC source circuit breaker (8) is on the ON position.
5. Check that the LED (17) is ON.
6. Turn the manual bypass switch from the BYPASS to the NORMAL position.
7. Follow initial start up sequence (See Section 3.1) in order to personalize the UPS.
8. Push the ON button (23) for more than 3 seconds.

The green LED (15) is ON, and the connected equipment is now protected by the UPS.

4.4 Hot Swapping the Battery Module

During the replacement of the Battery Module, it is imperative to use the same type and number of element as the original Battery Module provided with the UPS to maintain an identical level of performance and safety. In case of doubt, please refer to our web site at www.mgeops.com or call (800) 279-7776.

Figure 4-3: Rear View of the Battery Module.



4.4.1 Disconnecting the Battery Module

1. Switch the battery circuit breaker(s) (14) to the OFF position.
2. Disconnect the cables (40) and (42) from the Power Module.

The Battery Module can be replaced.

The connected equipment is powered by the UPS, but not protected.

It is also possible to replace the battery packs instead of Battery Module.

CAUTION: **Always replace both battery packs with new ones.**

To remove battery pack:

1. First, switch the battery circuit breaker(s) to the OFF position.

See Section 2.4.2 and follow instructions for battery pack replacement.

4.4.2 Re-Connecting the Battery Module

1. Reconnect the battery cables (40) and (42) to the Power Module.
2. Switch the battery circuit breaker(s) (14) to the ON position.

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5.0 Electrical Specifications

Electrical and Mechanical specifications for the EX 5/7/11 RT.

5.1 System Input/Output Power Ratings

Table 5-1: EX 5/7/11 RT Voltages and Frequency Characteristics.

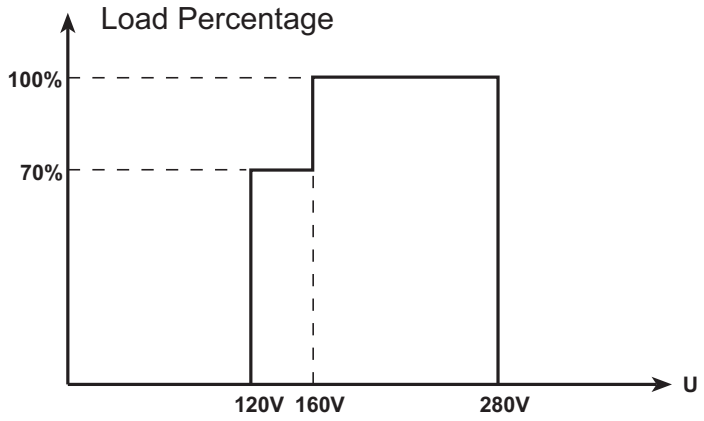
Source	Voltage	Frequency
Normal AC Source	156 to 280 VAC	40 to 70 Hz
Bypass AC Source	160 to 242 VAC*	58 to 62 Hz**
Load Output	200/208/220/230/240/250VAC (120/208/240Vac are possible with transformer module)	50/60 Hz autoranging (or frequency converter)

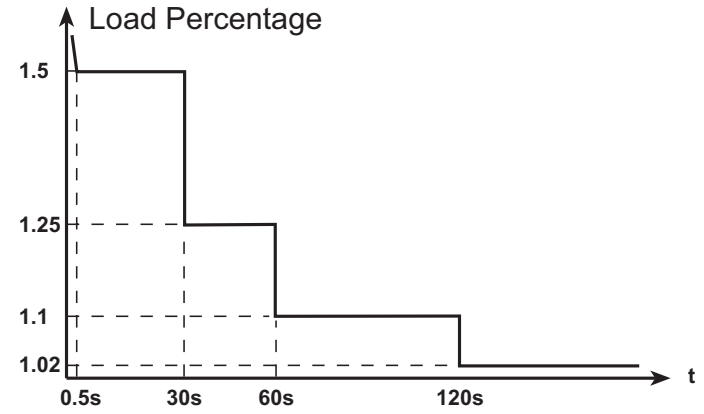
(*): depends on output voltage setting, can be modified by software.

(**): set to +/- 4% by default, (1, 2, 4, 8% are possible values), can be modified by software.

5.2 System Overload Characteristics

Figure 5-1: Power Supplied as a Function of Input Voltage (Left), and Permissible UPS Overloads as a Function of Time (Right).





5.3 System Back-Up Characteristics

Table 5-2: Back-Up Time (In Minutes).

11kVA With 9Ah Battery Modules:

	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Standard	90	40	25	18	14	11	9	7	6	5
Std + 1 EXB	191	93	61	43	30	24	20	17	15	14
Std + 2 EXB	293	143	96	71	53	44	34	27	24	22
Std + 3 EXB	392	199	135	99	84	60	51	43	35	30
Std + 4 EXB	525	261	172	120	102	86	67	56	48	42
Std + 5 EXB	637	312	201	142	113	102	87	68	60	53

7kVA With 7Ah Battery Modules:

	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Standard	121	57	37	28	21	15	12	10	8	7
Std + 1 EXB	266	125	80	61	53	37	30	24	22	20
Std + 2 EXB	447	203	124	101	83	66	55	45	38	32
Std + 3 EXB	578	244	185	128	108	90	75	61	53	45
Std + 4 EXB	756	364	245	169	132	110	98	77	69	57
Std + 5 EXB	889	453	287	232	164	133	118	102	86	72

5kVA (US Model Only) with 7Ah Battery Modules:

	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Standard	170	91	49	33	25	21	16	13	11	9
Std + 1 EXB	358	170	110	84	60	46	39	31	27	25
Std + 2 EXB	540	260	170	120	100	75	64	57	52	45
Std + 3 EXB	740	355	240	170	122	110	95	84	68	60
Std + 4 EXB	892	505	290	235	170	135	119	105	92	84
Std + 5 EXB	1220	540	355	260	225	170	140	120	110	100

5.4 System Short Circuit Protection

Short circuit current provided by EX 5/7/11 RT in normal or battery mode:

EX 5/7RT	110A for 80ms
EX 11RT	150A for 80ms

5.5 Accessories Electrical Characteristics

EX RT Transformer Module

Nominal power	11 kVA, 7 kVA
Nominal current	63 A, 35 A
Input voltage	208-240Vac
Output Voltage	120/208/240Vac
Frequency	50/60 Hz (+/-10%)
Isolation (EN 61558-1-2-4)	3.75 kV / 5 M ohms
Operating temperature	From 0° to +40°C
Max. operating rel. humidity	95%
Derating/altitude	Pn-10% > 1000 m

EX RT CLA Module

AC input voltage	156-280 Volts AC
Input frequency	40-70 Hz
Battery charge current	6 A DC

Table 5-3: Battery Recharge Time to Recover 90% of the Rated Back-Up Time After Discharge at Full Load.

	Configuration for 2 hours back-up time	Configuration for 4 hours back-up time	Configuration for 8 hours back-up time
EX 5RT	7 hours	15 hours	24 hours
EX 7RT	5 hours	12 hours	20 hours
EX 11RT	7 hours	15 hours	24 hours

Table 5-4: Efficiency On-line (RL Load) and Batteries Fully Charged.

kVA / kW	25%	50%	75%	100%	Output load percentage
5kVA /	90	91	91	91	Output: 220 / 230 / 240 Volts
4kWatts	89	90	91	91	Output: 200 / 208 / 250 Volts
7kVA /	90	91	91	91	Output: 220 / 230 / 240 Volts
4.9kWatts	89	90	91	90	Output: 200 / 208 / 250 Volts
11kVA /	90	91	90	90	Output: 220 / 230 / 240 Volts
8kWatts	89	90	90	89	Output: 200 / 208 / 250 Volts

Table 5-5: Efficiency On-Line (RCD Load) and Batteries Fully Charged.

kVA / kW	25%	50%	75%	100%	Output load percentage
5kVA /	90	91	91	92	Output: 220 / 230 / 240 Volts
4kWatts	89	91	91	91	Output: 200 / 208 / 250 Volts
7kVA /	90	91	91	92	Output: 220 / 230 / 240 Volts
4.9kWatts	89	91	91	91	Output: 200 / 208 / 250 Volts
11kVA /	90	92	91	91	Output: 220 / 230 / 240 Volts
8kWatts	89	91	90	90	Output: 200 / 208 / 250 Volts

Table 5-6: Efficiency on Battery (RCD Load).

kVA / kW	25%	50%	75%	100%	Output load percentage
5kVA /	87	89	89	88	Output: 220 / 230 / 240 Volts
4kWatts	87	88	89	88	Output: 200 / 208 / 250 Volts
7kVA /	87	89	89	88	Output: 220 / 230 / 240 Volts
4.9kWatts	87	88	89	88	Output: 200 / 208 / 250 Volts
11kVA /	89	90	89	87	Output: 220 / 230 / 240 Volts
8kWatts	88	90	89	88	Output: 200 / 208 / 250 Volts

Table 5-7: Efficiency on ECO Mode (All Kinds of Load) and Batteries Fully Charged.

kVA / kW	25%	50%	75%	100%	Output load percentage
5kVA / 4kWatts	96 95	97 96	96 96	97 96	Output: 220 / 230 / 240 Volts Output: 200 / 208 / 250 Volts
7kVA / 4.9kWatts	96 95	97 96	96 96	97 96	Output: 220 / 230 / 240 Volts Output: 200 / 208 / 250 Volts
11kVA / 8kWatts	96 95	97 96	96 96	97 96	Output: 220 / 230 / 240 Volts Output: 200 / 208 / 250 Volts

5.6 Heat Rejection

Table 5-8: Full Load Heat Rejection in BTUs/hr.

System	Operation Mode	
	On-line	On Battery
5kVA	1350	1861
7kVA	1654	2280
11kVA	3033	3723

5.7 Environmental Characteristics

- The operating temperature is 0 to 40°C (8 hours at 45°C), however optimum operation is within the +20 to +25°C range and at 5-95% humidity, non-condensing at altitude up to 3280ft without de-rating.
- The storage temperature: -20 to 40°C. Humidity: 5-95%, non condensing.
- Battery back-up time is adversely affected by high and low temperatures. It is significantly reduced at temperatures under 10°C. Above 25°C, battery service life is cut in half every 10°C. Above 40°C, battery manufacturers no longer guarantee operation due to the risk of thermal runaway.
- Air enters through the front air vent grills and exits through the back. Always keep air vent grills unobstructed.

MGE Office Protection Systems
Customer Care Center

Technical Support and Product Services

Technical questions? If you encounter a problem while following the instructions in this manual, or have questions about the operation, repair, or servicing of your equipment, please visit our web site www.mgeops.com for complete service information.

To insure that your questions are correctly answered, please obtain the part number, assembly number, and serial number of the unit and include them in any discussions or correspondence.

Part Number: _____

Assembly Number: _____

Serial number: _____

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For further details please visit our website: www.mgeops.com

Date: _____

RMA Number: _____

Contact Name: _____

Glossary

Term used	Definition/Meaning
@	At.
/	And/or.
+/-	Plus or Minus.
≤	Equal to or less than.
#	Number.
°C	Degree Celsius.
°F	Degree Fahrenheit.
Ø	Phase angle.
Ω	Ohm; unit of resistance.
®	Trade Mark.
2nd	Second.
AC or ac	Alternating current, also implies root-mean-square (rms).
Ambient Temp.	Temperature of surrounding air.
Ambient noise	Acoustical noise of surrounding environment.
ANSI	American National Standard Institute.
AWG	American Wire Gauge.
Breaker	Electrical circuit interrupter.
BTU or Btu	British thermal unit. Defined as the amount of heat required to raise the temperature of one pound of water by 1°F.
Carrier	The company or individual responsible for delivering goods from one location to another.
C	Common.
CB	Circuit breaker.
cm	Centimeter.
Conduit	A flexible or rigid tube enclosing electrical conductors.
C.S.S.	Customer Support Service.
Current rating	The maximum current that a conductor or equipment can carry reliably without damage.
dBA	Decibel Adjusted.

dBrnC	Decibel above reference noise.
DC or dc	Direct current, or voltage.
Earth ground	A ground circuit that has contact with the earth.
Electrician	Refers to an installation electrician qualified to install heavy-duty electrical components in accordance with local codes and regulations. Not necessarily qualified to maintain or repair electrical or electronic equipment.
FET	Field effect transistor.
Freq.	Frequency.
Frequency slew rate	The change in frequency per unit of time. Given in term of Hz per second (Hz/sec.).
GND	Ground (safety).
Hz	Hertz, frequency measurement unit, 1Hz is one cycle per second.
I	Current.
IEC	International Electrotechnical Commission.
IEEE	Institute of Electrical and Electronic Engineers.
IGBT	Insulated gate bipolar transistors.
Input branch circuit	The input circuit from the building power panel to the equipment.
Inverter	An electrical circuit that generates an AC voltage source from a DC voltage source.
Inverter mode	See “on-line” mode.
I/O	Input/Output.
I/T or IT	Information Technology.
kVA	KiloVolt-Ampere; is equal to 1000 Volt-Ampere.
L	Line.
LCD	Liquid-Crystal Display unit.
LED	Light Emitting Diode.
Mains or Mains 1	Main AC input source.
Mains 2	Bypass AC input source.
mA	Milliampere.
MAX.	Maximum.
MCM	Thousand circular mil; standard wire sizes for multiple stranded conductors over 4/0 AWG in diameter. M is from Roman numerical system indicating 1000.
N	Neutral.
NC	Normally closed.
NEC	National Electrical Code.
NFPA	National Fire Protection Association.
NO	Normally open.

OSHA	Occupational Safety and Health Agency.
PCA	Printed circuit assembly.
PCB	Printed circuit board.
PN	Part number.
PWM	Pulse Width Modulation.
RCD Load	Load consists of resistor, capacitor and diode. A computer with switched mode power supply is considered a RCD load.
RL Load	Load consists of resistor, and inductor. A fan or a drill is considered a RL load.
SCR	Silicon controlled rectifier.
Shipping damage	Any damage done to an article while it is in transit.
SPDT	Single Pole Double Throw.
Static Transfer	An solid state switching mechanism electronically controlled to pass AC power directly from the utility to an output load.
Technician	Refers to an electronic technician qualified to maintain and repair electronic equipment. Not necessarily qualified to install electrical wiring.
V	Volts.
VA	Volt amperes.
VA	Volt-amps, unit for apparent power measurement, equal V x I.
VAC or Vac	Voltage of AC type.
VDC or Vdc	Voltage of DC type.
ve	Battery voltage.
Via	By way of.

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